2021-03

THE CROWD MACHINE: LEVERAGING EMERGENT CROWD BEHAVIOR IN POLICY AND RESPONSE

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THESIS

THE CROWD MACHINE: LEVERAGING EMERGENT CROWD BEHAVIOR IN POLICY AND RESPONSE

by

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March 2021

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** March 2021	**3. REPORT TYPE AND DATES COVERED** Master's thesis

4. TITLE AND SUBTITLE THE CROWD MACHINE: LEVERAGING EMERGENT CROWD BEHAVIOR IN POLICY AND RESPONSE	**5. FUNDING NUMBERS**
6. AUTHOR(S) Craig M. Cooper	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.	**12b. DISTRIBUTION CODE** A

13. ABSTRACT (maximum 200 words)

All across the country, officials and planners of the first-responder community plan for events of various types, yet their plans do not adequately account for crowd behavior when the event is interrupted by an act of violence that turns into a mass-casualty incident, or a "focus event." This research contests early crowd psychology studies and presents the contemporary social identity theory, elaborated social identity model, and emergence model as better lenses for crowd behavior in responding to a focus event. Case studies of the 2013 Boston Marathon bombing and the 2017 Las Vegas mass shooting are used to analyze crowds that experienced focus events through the perspective of complex adaptive systems. A new framework that incorporates the elements of stress, panic, chaos, and priming is then presented to assist officials and planners with planning for crowds experiencing a focus event, with the aim of leveraging crowd emergence. The new framework presented in this research leads to a set of actionable recommendations for policymakers and planners. Ultimately, this thesis challenges officials and planners of the first-responder community to evaluate crowds as complex adaptive systems and explore the ability to leverage crowds for a more effective response.

14. SUBJECT TERMS crowds, crowd behavior, focus event, Boston Marathon bombing, Las Vegas shooting, CAS, complex adaptive systems, emergence, stress, panic, chaos, priming	**15. NUMBER OF PAGES** 91
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	**18. SECURITY CLASSIFICATION OF THIS PAGE**	**19. SECURITY CLASSIFICATION OF ABSTRACT**	**20. LIMITATION OF ABSTRACT**
Unclassified	Unclassified	Unclassified	UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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THE CROWD MACHINE: LEVERAGING EMERGENT CROWD BEHAVIOR IN POLICY AND RESPONSE

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Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
March 2021**

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ABSTRACT

All across the country, officials and planners of the first-responder community plan for events of various types, yet their plans do not adequately account for crowd behavior when the event is interrupted by an act of violence that turns into a mass-casualty incident, or a "focus event." This research contests early crowd psychology studies and presents the contemporary social identity theory, elaborated social identity model, and emergence model as better lenses for crowd behavior in responding to a focus event. Case studies of the 2013 Boston Marathon bombing and the 2017 Las Vegas mass shooting are used to analyze crowds that experienced focus events through the perspective of complex adaptive systems. A new framework that incorporates the elements of stress, panic, chaos, and priming is then presented to assist officials and planners with planning for crowds experiencing a focus event, with the aim of leveraging crowd emergence. The new framework presented in this research leads to a set of actionable recommendations for policymakers and planners. Ultimately, this thesis challenges officials and planners of the first-responder community to evaluate crowds as complex adaptive systems and explore the ability to leverage crowds for a more effective response.

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LIST OF ACRONYMS AND ABBREVIATIONS

CAS	complex adaptive system
CBRN	chemical, biological, radiological, nuclear
CBRNE	chemical, biological, radiological, nuclear, and explosives
EMS	emergency medical services
ESIM	elaborated social identity model
FAO	fire alarm office
FEMA	Federal Emergency Management Agency
IED	improvised explosive devices
JHAT	Joint Hazard Assessment Team
LVMPD	Las Vegas Metropolitan Police Department
MACC	Multi Agency Coordination Center
MANG	Massachusetts National Guard
MSP	Massachusetts State Police
NFPA	National Fire Protection Association
SIT	social identity theory
UCC	Unified Coordination/Command Center

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EXECUTIVE SUMMARY

Crowds that experience a *focus event*—a mass-casualty incident that arises during a pre-planned event—have repeatedly taken on the role of "immediate responders."[1] However, without an understanding of crowd behavior, officials and emergency response planners cannot leverage it for a more effective response. This thesis challenges traditional studies of crowd behavior to glean an understanding of crowds' reactions to focus events.

For example, the early works of Gustave Le Bon, which have influenced modern-day planning, leave officials and planners to imagine crowds as mindless mobs. Yet a crowd that experiences a focus event more closely resembles a complex adaptive system, particularly its non-linear nature. Through the lens of a complex adaptive system, a crowd cannot devolve into chaos. Indeed, complex adaptive systems operate at the edge of chaos without ever achieving it, the result of living systems' seeking order—the chaordic.[2]

This study employs case study analysis of the 2013 Boston Marathon bombing and the 2017 Las Vegas mass shooting to evaluate both crowds as complex adaptive systems, looking for correlating crowd behavior while examining the pre-event response posture and initial response by first responders. The research was derived from open sources, including after-action reports, journal articles, and formal inquiries; no new interviews were conducted. The case studies evaluate the crowd emergence witnessed in Boston and Las Vegas, as both supplied needed assistance but also hindered the responding agencies. The findings confirm the non-linearity of crowds, their impending emergence, and the need to shed old frameworks of crowd behavior that explain crowds as mindless mobs.

The findings in the case studies chapter led this research to formulate a new framework for officials and planners to consider in contingency planning for a focus event. The framework comprises stress, panic, chaos, and priming. Research for this thesis and

[1] Amir Khorram-Manesh et al., "Immediate Response to Major Incidents: Defining an Immediate Responder!," *European Journal of Trauma and Emergency Surgery* 46 (2020): 1310, https://doi.org/10.1007/s00068-019-01133-1.

[2] Jonathan Sapir, *Thriving at the Edge of Chaos: Managing Projects as Complex Adaptive Systems* (Boca Raton: Taylor & Francis, 2020), 52.

the case studies demonstrate that *stress* is responsible for fight-or-flight behavior, which translates into focus event preparations for officials.[3] Moreover, in most focus events, stress compels emergent behavior in immediate responders, while *panic* and *mass panic* are misnomers in the context of crowds experiencing focus events.[4] Furthermore, communication with the crowd does not incite panic as traditional authoritarian crowd-management discourse suggests; rather, communication is a positive action that officials can employ to acquire credibility with the crowd and to assist responders with their response.[5]

Chaos in the newly presented framework highlights the non-linearity of crowds experiencing a focus event, because as complex adaptive systems, they seek order—stabilizing the chaordic zone with flexibility to react to the rapidly evolving scene.[6] Planners can leverage the opportunities presented by the crowd within the chaordic zone through an understanding of *priming*, the final element of the framework. Priming means that an individual possesses skills to draw from to intervene during a focus event, and planners can capitalize on the inevitable emergence of such priming within a crowd. For instance, the hemorrhage control skills learned in "Stop the Bleed" training prime an individual to apply a tourniquet to an injured crowd member during a focus event. Officials responsible for the safety of individuals attending events have an opportunity not only to plan for crowd members who are primed to be immediate responders but also to prime their local constituents to build general resiliency within their communities.

This thesis finds that planners who view crowds experiencing a focus event through the lens of a complex adaptive system will better understand crowd behavior; thus, officials can create a more effective response that leverages the crowd within the first 15 minutes

[3] Robert M. Sapolsky, *Behave: The Biology of Humans at Our Best and Worst* (New York: Penguin Books, 2018), 125–26.

[4] John Drury, *Group Dynamics: Mass Emergency Behavior* (London: SAGE Video Tutorials, 2016), video transcript, 3–4.

[5] Chris Cocking and John Drury, "Talking about Hillsborough: 'Panic' as Discourse in Survivors' Accounts of the 1989 Football Stadium Disaster," *Journal of Community & Applied Social Psychology* 24, no. 2 (March/April 2014): 88, https://doi.org/10.1002/casp.2153.

[6] Sapir, *Thriving at the Edge of Chaos*, 63.

of the act of violence. Among the actionable recommendations of this research, planners should evaluate crowd demographics for upcoming events as a factor in crowd emergence, as well as responder distractors caused by individuals within the crowd. Moreover, when agencies pre-deploy resources along with a pre-established unified command structure, they may more effectively leverage the crowd.

The current mentality of the first-responder community does not acknowledge the opportunity that lies within crowds experiencing a focus event, yet policymakers and planners alike can and should account for the inevitability of crowd emergence, made manifest in immediate responders. Moreover, future research should reevaluate crowds as complex adaptive systems to find new ways to leverage them during focus events. Until then, this thesis provides planners with a modernized framework to leverage stress, panic, chaos, and priming in a crowd within the first 15 minutes of an emergency response to improve the outcome.

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ACKNOWLEDGMENTS

I wish to thank my wife and best friend, Kelly, for her unconditional love, support, patience, and understanding throughout this process and every day. I couldn't conceive of doing this without you by my side. Additionally, my loving daughters, Natalie and Gracie, motivate me to be my best self. You all have such genuine kindness toward our fellow man, and you inspire me to serve the homeland security enterprise to my greatest ability.

Next, I would like to thank my thesis team—Dr. Carolyn Halladay and Dr. Kathleen Kiernan—whose guidance pushed me beyond what I thought was possible with my writing and kept my research focused. My journey would not have been complete without your insight, feedback, and encouraging conversations. I enjoyed the experience and evolved because of your mentorship. In addition, Noel Yucuis, your expertise and composure were a welcomed and valued addition to the team.

To the staff of CHDS who supported this endeavor in some capacity: We experienced the majority of this process during a pandemic that challenged the customary way of conducting the master's program. I appreciate the extra effort it took to keep my cohort on track. I would especially like to thank Dr. B for his empathy, as we all experienced unexpected challenges, and for being our voice with the faculty and leadership when we needed him to be. I would also like to thank Eric, Craig, Greta, Marianne, Heather, and Kyle, who always provided us with the support we needed.

Lastly, to my cohort, 1905/1906: I'm so impressed by your resilience and honored to have experienced this journey with you. Thank you for your friendship!

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IN REMEMBRANCE

As a public servant, I feel responsible for the safety of my family, community, and visitors to my home town alike, and it is my honor to serve. While I cannot fully express my sympathy to those who were injured or lost their lives in the wicked acts in Boston and Las Vegas—or to their families and loved ones—I have tried to pay my respects through this research. As such, I dedicate this thesis to the memories of the individuals listed below. My hope is that this thesis assists future communities in their efforts to battle the wickedness we are charged to protect against.

Those We Lost in Boston[1]

Martin Richard, 8	Krystle Campbell, 29	Lu Lingzi, 23

Those We Lost in Las Vegas[2]

Hannah Lassette Ahlers, 34	Heather Lorraine Alvarado, 35	Charleston Hartfield, 34
Christopher Hazencomb, 44	Dorene Anderson, 49	Jennifer Topaz Irvine, 42
Quinton Robbins, 20	Melissa V. Ramirez, 26	Jordyn N. Rivera, 21
Carrie Rae Barnette, 34	Teresa Nicol Kimura, 38	Cameron Robinson, 28
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Stephen Richard Berger, 44	Candice Ryan Bowers, 40	Carly Anne Kreibaum, 34
Rhonda M. LeRocque, 42	Denise Burditus, 50	Victor L. Link, 55
Brett Schwanbeck, 61	Thomas Day Jr., 54	Patricia Mestas, 67
Brennan Lee Stewart, 30	Lisa Romero-Muniz, 48	Christopher Louis Roybal, 28
Sandra Casey, 34	Jordan McIldoon, 24	Bailey Schweitzer, 20
Laura Anne Shipp, 50	Denise Cohen, 58	Austin William Davis, 29
Calla-Marie Medig, 28	James Melton, 29	Erick Silva, 21
Susan Smith, 53	Christiana Duarte, 22	Austin Cooper Meyer, 24
Derrick Dean Taylor, 56	Stacee Ann Etcheber, 50	Adrian Allan Murfitt, 35
Neysa C. Tonks, 46	Brian S. Fraser, 39	Rachael Kathleen Parker, 33
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Dana Leann Gardner, 52	Carolyn Lee Parsons, 31	William W. Wolfe Jr., 42
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Angela C. Gomez, 20	Lisa Marie Patterson, 46	Andrea Lee Anna Castilla, 28
Kelsey Breanne Meadows, 28		

[1] Source: Boston Marathon Project Management Team, *After Action Report for the Response to the 2013 Boston Marathon Bombings* (Boston: Boston Marathon Project Management Team, 2014), 15, https://www.mass.gov/files/documents/2016/09/uz/after-action-report-for-the-response-to-the-2013-boston-marathon-bombings.pdf.

[2] Source: Federal Emergency Management Agency, *1 October After-Action Report* (Washington, DC: Federal Emergency Management Agency, 2018), 49, https://www.hsdl.org/?abstract&did=814668.

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I. INTRODUCTION

The mass shooting in Las Vegas on October 1, 2017, revealed an ongoing challenge with first-response agencies: dealing with the crowd. In the incident on the Strip, as in other emergent events, fire departments and emergency medical services (EMS) responders arrived within minutes at the site of the incident; meanwhile, large numbers of concert-goers fled the scene to seek assistance and escape gunfire, with some even scaling barbed wire and crossing an active runway at McCarran International Airport.[1] For the most part, the fire department and private ambulance response policies had not accounted for such crowd behavior. Thus, by the time the resources for the fire department and ambulances arrived, their response was not completely effective; many of the concert-goers had fled the scene, medical supplies for traumatic injuries were inadequate, first responders were confused about the coordination of resources, and patient tracking fell by the wayside.[2]

In total, more than 800 people were injured, and approximately 250 were transported by professional medical services.[3] Similarly, 118 of the 378 victims of the Boston Marathon bombing on April 15, 2013, were transported by medical providers.[4] In other words, both incidents saw approximately 30–40 percent of the victims transported by professional medical services while the remaining 60–70 percent by non-medical transport to area hospitals in an uncoordinated effort. As noted in Boston and Las Vegas, sending approximately six or seven of every 10 injured patrons of an event to hospitals in an

[1] Federal Emergency Management Agency, *1 October After-Action Report* (Washington, DC: Federal Emergency Management Agency, 2018), 22, https://www.hsdl.org/?abstract&did=814668.

[2] Federal Emergency Management Agency.

[3] Area hospitals treated nearly 600 patients from the shooting. Sheri Fink, "First Medics on Scene in Las Vegas: Other Fans," *New York Times*, October 16, 2017; Federal Emergency Management Agency, *1 October After-Action Report*, 13.

[4] Boston Marathon Project Management Team, *After Action Report for the Response to the 2013 Boston Marathon Bombings* (Boston: Boston Marathon Project Management Team, 2014), 40, https://www.mass.gov/files/documents/2016/09/uz/after-action-report-for-the-response-to-the-2013-boston-marathon-bombings.pdf.

uncoordinated manner by non-traditional transport may cause an unmanageable surge to the local hospital system.[5]

Historically, the demographics of the crowd and the likelihood of emergence have not been connected proactively. Could the anticipation of emergent behavior prove beneficial to planners and responders? One challenge in planning for crowd behavior during a *focus event*—a mass-casualty incident within a pre-planned event—is the unpredictable nature of the occurrence.[6] The responder community contributes to this planning challenge because its myopic approach to event planning does not account for crowd behavior beyond the traditional view of the crowd as a mindless mob, which misses an opportunity to plan for crowd emergence. Insufficient scholarship in capturing data to study crowd behavior during a focus event also adds to the challenges of more effective planning. The scope of study on crowd behavior seems limited to pre-planned events or concerts without a focus event; however, limited data is available for a retrospective evaluation of crowd behavior during a focus event.

Furthermore, when a focus event does occur, the circumstances—including acts of violence—surrounding it vary from event to event and influence the crowd's behavior. Or do they? As noted by the Federal Emergency Management Agency (FEMA) in the *1 October After-Action Report*, the crowd rendered unanticipated assistance to the injured as "immediate" responders, whose good Samaritan acts assisted in the overall response with medical care and evacuation.[7] Ultimately, this emergence contributed positively to the outcome in Las Vegas:

> Good Samaritan stories of civilians—as well as many off-duty first responders and military—aiding, protecting, and providing care to the wounded were a major success observed in this response. These efforts were

[5] Furthermore, it is unclear whether the numbers transported by EMS services in Boston and Las Vegas represent an effective response during a mass-casualty incident.

[6] Unlike random acts of violence that occur outside an event, planned events give officials the opportunity to evaluate things such as crowd size, crowd demographics, event location or venue, and the prominence of the event.

[7] Federal Emergency Management Agency, *1 October After-Action Report*, 18–19.

> essential to saving many lives before emergency medical crews were able to access the site.[8]

As FEMA notes, among the Las Vegas concert-goers were many individuals with the training and mindset needed to help effectively: off-duty first-responders, active-duty and retired military members, and nurses.[9] Their prior training and experiences speak to crowd *priming*, as noted by John Bargh in emphasizing how prior knowledge and experiences can influence the emergent, crowd-saving behavior observed in Las Vegas.[10] Other concert-goers who were not primed for this event still contributed to the life-saving efforts alongside their primed fellow concert-goers. Could their behavior have been predicted, and could the first-response community have planned for this behavior? As far as the policies and procedures of response agencies are concerned, is chaos an adequate descriptor, and how can responders plan for it more intelligently?

A. PROBLEM STATEMENT

Crowd behavior during the first 15 minutes of an incident mimics a complex adaptive system. The recognition of how simple organisms are capable of producing complex systems can be traced back to the work of Alan Touring in 1952.[11] Touring's work did not gain traction until Evelyn Keller and Lee Segal picked up the theory in the late 1960s with their description of a complex system produced by slime mold.[12] Understanding how the formation of a system is derived from the emergence of individual properties that did not exist on their own could assist in the general understanding of emergent behavior.[13] The correlation to crowds for the purposes of this research is noted by MacLennan: "Complex systems manifest emergent properties which cannot be

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[8] Federal Emergency Management Agency, 22.

[9] Federal Emergency Management Agency, 18–19.

[10] Malcolm Gladwell, *Blink: The Power of Thinking without Thinking* (New York: Back Bay Books, 2005), 76.

[11] Ted Carmichael and Mirsad Hadzikadic, "The Fundamentals of Complex Adaptive Systems," in *Complex Adaptive Systems*, ed. Ted Carmichael, Andrew Collins, and Mirsad Hadzikadic (Cham: Springer, 2019), 6, https://doi.org/10.1007/978-3-030-20309-2_1.

[12] Carmichael and Hadzikadic, 6.

[13] Bernard Testa and Lemont B. Kier, "Emergence and Dissolvence in the Self-Organisation of Complex Systems," *Entropy* 2, no. 1 (2000): 1, https://doi.org/10.3390/e2010001.

explained in terms of simple, linear interactions among the system's components."[14] Planners could obtain crowd demographics (system components) prior to an event to leverage the crowd during a focus event and study its behavior later. The understanding of crowd behavior has been studied from a variety of perspectives, and it is the intent of this thesis to further explore how crowd behavior emerges as a complex adaptive system, particularly during a focus event, in hopes of increasing responder efficiency and effectiveness with policy recommendations.

B. RESEARCH QUESTION

By understanding crowd behavior as a complex adaptive system in a discordant environment (e.g., focus event), how could emergency responders leverage a crowd for a more effective response?

C. LITERATURE REVIEW

The growing threat environment surrounding events is evolving with increasing numbers of attacks across the globe. Although event planners within the first-responder community continually evaluate and adapt to the threat environment, there is a lack of research and adaptability emphasized in relation to the response effort. This literature review identifies the contributing factors in human behavior during a focus event with the overall intent of generating a more effective response through policies and event planning that acknowledge the actual behavior of crowds. It focuses on crowd behavior, particularly emergence in a crowd, and the correlation between complex adaptive systems and crowds. The parallels drawn from complex adaptive systems and crowds contribute to the overall understanding of crowds and how to plan for a focus event.

1. Crowd Behavior

Crowds comprise individuals, and each individual has a unique response to a focus event, that is, until they are in a crowd and experience deindividualization, or lose sense of

[14] Bruce MacLennan, "Evolutionary Psychology, Complex Systems, and Social Theory" (Knoxville: University of Tennessee, 2007), 4, http://web.eecs.utk.edu/~bmaclenn/papers/EPCSST.pdf.

personal identity.[15] This phenomenon, in which individuals lose rational thinking and resort to primitive behavior in a crowd setting, has been studied as far back as the work of Gustave Le Bon in the late 1800s.[16] This deindividualization serves as a defense mechanism against the threat environment, such as during a focus event.[17] Deindividualization is a single facet of crowd behavior, and although the phenomenon does take effect, not all people in the crowd experience it in the same way. There are many cited reasons that individuals experience deindividualization differently: the illusion of anonymity or unanimity, the sense of power, shared or diffused responsibility, or sensory arousal or overload, to name the most common.[18]

The studies of Serge Moscovici are an expansion of the early works of Le Bon.[19] A pioneer of crowd behavior studies, Le Bon defined a crowd as "a gathering of individuals of whatever nationality, profession, or sex, and whatever be the chances that have brought them together."[20] Moreover, Le Bon describes the mentality of a crowd as a collective mind whereby each individual thinks, feels, and acts differently from his or her existence outside the crowd.[21] While Le Bon is noted as an originator of crowd studies, his work was most interested in political influence. Moscovici explored crowd behavior in a similar way. Although their studies are not directly related to focus events, they laid the groundwork for understanding how or what a crowd feels and acts. For example, "Crowds have a constant need of mental coherence and emotional certainty to enable them to understand events and make sense of an unstable universe whose plaything they seem to be."[22] This observation

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[15] Andrew Adamatzky, *Dynamics of Crowd-Minds: Patterns of Irrationality in Emotions, Beliefs, and Actions*, World Scientific Series on Nonlinear Science, series A, vol. 54 (Singapore: World Scientific Publishing, 2005), 6, ProQuest.

[16] Everett Dean Martin, *The Behavior of Crowds: A Psychological Study* (New York: Harper & Brothers, 1920), 31, http://www.gutenberg.org/ebooks/40914.

[17] Adamatzky, *Dynamics of Crowd-Minds*, 54:6.

[18] Adamatzky, 54:6–7.

[19] Serge Moscovici, *The Age of the Crowd: A Historical Treatise on Mass Psychology* (Cambridge: Cambridge University Press, 1985), 19.

[20] Gustave Le Bon, *The Crowd: A Study of the Popular Mind* (San Bernardino: Project Gutenberg, 1996), 11, http://www.gutenberg.org/ebooks/445.

[21] Le Bon, 13.

[22] Moscovici, *The Age of the Crowd*, 116.

of Moscovici is applicable to crowds experiencing a focus event through mental coherence, emotional certainty, and sensemaking.

The early research of Le Bon focused on crowd behavior as it related to mob behavior and the politics of manipulating a crowd. The relevance of Le Bon's research is in the crowd he studied and similarities identified in the modern-day crowd as defined in this thesis. Le Bon, by all accounts, was the first to recognize the change in behavior of individuals when engaged as part of a crowd. The literature of Le Bon is foundational to current research. Thus, by understanding the reactive variances of the crowd during the first 15 minutes of a focus event, the researcher argues that a more effective response is possible.

Scholars have long studied what happens to individuals when they are in a crowd. However, when first-responder agencies plan for events or create table-top exercises to address a focus event, the presumed crowd behavior conforms with their pre-scripted response plans. Generalized response plans account for a mass-casualty incident, but nowhere is the crowd profile addressed as a preparatory consideration. Rick Griggs recognizes the importance of addressing "crowd structure" in his research on crowd dynamics and safety at outside events.[23] The differences in crowd structure and subsequent behavior noted from four different events is worth studying. The results from Griggs's study show varying behavior, from the crowd's obeying orders in a stadium and remaining relatively calm, to being trampled to death in a chaotic and unmanageable rush, to aiding injured patrons immediately after a focus event occurred.[24]

The idea that all individuals within a crowd make conscious decisions challenges deindividualization and opens the possibility for leveraging the crowd for a more effective response. Individuals within a crowd begin to experience emotion in a variety of ways

[23] Rick Griggs, "Fire Department Perspective: Crowd Dynamics and Safety at Outside Events" (master's thesis, Naval Postgraduate School, 2017).

[24] Griggs, 47–77.

based on their internal sensations.[25] For example, some subsets of the crowd freeze, jump, or even laugh in the face of fear.[26]

2. Emergence

An additional consideration for crowd behavior lies in emergence, a subfield of collective behavior.[27] Emergence has been observed and studied by researchers since the 1950s and has evolved into an important social phenomenon that informs a significant element of focus-event response.[28] Simply stated, emergence is the crowd's transitioning into a responder role to assist their fellow man. However, emergent behavior does not manifest without cause. Quarantelli notes the conditions surrounding emergence: "It could be said that a necessary condition for emergence is a perceived need to act on urgent matters."[29] A notable relationship between emergence and convergence is addressed later in this section. Conditions for emergent behavior—as noted by Griggs—in the bombing at the Ariana Grande concert in Manchester, United Kingdom, in May 2017 were manifest in thousands of patrons rushing into the arena to provide care and transport to the injured.[30] Much of the work by Griggs is relevant to the focus of this research in that it emphasizes emergence at several focus events. However, like other scholars who have recognized the impact of emergent behavior to the homeland security enterprise, Griggs also places a significant emphasis of research on natural disasters by evaluating earthquakes and weather events.[31]

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[25] Lisa Feldman Barrett, *How Emotions Are Made: The Secret Life of the Brain* (New York: First Mariner Books, 2018), 161.

[26] Barrett, 160–61.

[27] E. L. Quarantelli, "Emergent Behaviors and Groups in the Crisis Time Periods of Disaster" (Newark: University of Delaware, 1994), 1, http://udspace.udel.edu/handle/19716/591.

[28] Quarantelli, 1–2.

[29] Quarantelli, 14.

[30] Griggs, "Fire Department Perspective," 27.

[31] Griggs, 22–27.

Past focus events are teeming with video evidence of the public's assisting victims long before responders arrive on scene.[32] Regarding assumptions about people's reactions to a focus event, research has found that helping behavior far outweighs selfish behavior.[33] While emergence can take many forms, the focus of this research is related to Quarantelli's idea "that a necessary condition for emergence is a perceived need to act on urgent matters."[34]

The importance of emergence to responders is manifold and should not be dismissed, or treated lightly. Considering the potentially large numbers of patients who might be present at a focus event, it is unrealistic to assume that first-responder agencies have the sufficient number of personnel or resources to provide timely care and transport to hundreds or even thousands of wounded victims. Emergence can display itself in many beneficial and life-saving forms during a focus event, including assistance with evacuation, hemorrhage control, the application of tourniquets, and patient transport.[35] In 2013, Cocking and Drury referenced these emergent groups as "zero responders," and in more recent research, the emergent groups at a focus event are referred to as "immediate responders."[36] For the sake of identifying a single term, this research uses the latter moniker to describe these emergent groups.

Immediate responders are not without their share of complications to the response effort. The assistance of transporting victims in response to the Las Vegas high-rise shooting is a good example. The immediate responders circumvented the EMS transport system and placed victims in personal vehicles for transport to the first hospital that

[32] Amir Khorram-Manesh et al., "Immediate Response to Major Incidents: Defining an Immediate Responder!," *European Journal of Trauma and Emergency Surgery* 46 (2020): 1310, https://doi.org/10.1007/s00068-019-01133-1.

[33] John Drury, *Group Dynamics: Mass Emergency Behavior* (London: SAGE Video Tutorials, 2016), video transcript, 4–5.

[34] Quarantelli, "Emergent Behaviors and Groups," 14.

[35] Tracey O. Smith et al., "Engaging Active Bystanders in Mass Casualty Events and Other Life-Threatening Emergencies: A Pilot Training Course Demonstration," *Disaster Medicine and Public Health Preparedness* 10, no. 2 (April 2016): 286, https://doi.org/10.1017/dmp.2015.177.

[36] Chris Cocking and John Drury, "Talking about Hillsborough: 'Panic' as Discourse in Survivors' Accounts of the 1989 Football Stadium Disaster," *Journal of Community & Applied Social Psychology* 24, no. 2 (March/April 2014): 97, https://doi.org/10.1002/casp.2153; Khorram-Manesh et al., "Immediate Response to Major Incidents."

populated on a phone search.[37] While victims were transported to more definitive care, not all victims were delivered to the most appropriate hospital—for example, a trauma center—for their specific wounds. An additional challenge to the non-traditional transport is accountability. As response agencies conclude the response effort and transition to recovery, they have an information gap for victim counts and conditions. Such situations can become problematic when the public starts demanding answers about missing friends or family members (see Table 1). Planning for the inevitable non-traditional transport to the hospital of victims by immediate responders is a prudent way forward.

Table 1. Traditional vs. Non-traditional Transport to Hospitals at Focus Events[38]

Focus Event	# Injured	Traditional Transport	Non-traditional Transport	% Non-traditional
Aurora 2012	*23	3	20	87
Boston 2013	264	118	146	55
Las Vegas 2017	~850	~250	~600	~70

*The 23 patients in Aurora account only for those transported to the University of Colorado Hospital. A total of 58 wounded were transported to hospitals.

The first-response community expects responder convergence as part of a planned system, but it must equally address the familiar element of emergence. As responders converge, immediate responders have already emerged and acted. The system has been redefined, and everyone has a role—as living things tend to make order of randomness.[39]

[37] Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination, Fatality Management, and Recovery Capability Reviews—An Assessment of the Clark County, Nevada Public Safety System with Respect to the National Preparedness Goal Mission Areas: Response and Recovery* (Las Vegas: Clark County Office of Emergency Management and Homeland Security, 2018), 17.

[38] Adapted from Tim Darragh, "At LVH, Lessons from Aurora: An ER Doctor Who Treated Colorado Theater Shooting Victims Urges Practice, but Be Ready to Break the Rules," *Morning Call*, May 22, 2013, ProQuest; Boston Marathon Project Management Team, *After Action Report*, 4, 40; Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 17.

[39] Richard T. Pascale, Mark Millemann, and Linda Gioja, *Surfing the Edge of Chaos: The Laws of Nature and the New Laws of Business* (New York: Three Rivers Press, 2000), 154.

When immediate responders emerge in a positive and helping way, the emerging system will be productive and work smoothly.[40]

Studies of convergence are derived from observations of people moving toward the impacted area of natural disasters from the outside.[41] Fritz and Mathewson have clearly distinguished three types of convergence: personal, a person moving by foot, vehicle, or other means; informational, the movement of messages; and material, the movement of equipment and supplies.[42] For this research, the primary focus is on personal convergence with some interest in the informational variety. As previously noted, emergence is a perceived need to respond urgently whereas convergence is movement to a disaster area. Quarantelli makes the association between emergence and convergence in evaluating earthquake response: "[The] crisis phase did not provoke as much emergence as might have been expected given the substantially greater than typical convergence of outside groups on the stricken community."[43] This dichotomy is crucial in understanding and differentiating crowd emergence within 15 minutes of a focus event from general convergence in response to a reported disaster. While convergence will undoubtedly occur at a focus event, as noted in Griggs's work, the event crowd falls primarily into the emergent category and is the emphasis of the research question.

The experiences of the researcher have shown that slower-moving responses to natural disasters vis-à-vis focus events necessitate the evaluation of emergence specific to the latter. The immediate response of emergence within the first 15 minutes of a focus event is vastly different from the deliberate emergence for a natural disaster. Natural disasters, such as hurricanes and tornadoes, often come with a warning whereas a focus event does not. For example, research conducted by Nancy Casper examines how

[40] Glenda Holladay Eoyang, "Conditions for Self-Organizing in Human Systems," *Futurics* 28, no. 3/4 (2004): 12, ProQuest.

[41] Charles E. Fritz and John H. Mathewson, *Convergence Behavior in Disasters: A Problem in Social Control*, Publication 476 (Washington, DC: National Academy of Sciences, 1957), 1–3.

[42] Fritz and Mathewson, 4.

[43] Quarantelli, "Emergent Behaviors and Groups," 8.

leadership manages emergent behavior during a disaster.[44] Casper's approach delves into managing the behavior in a natural disaster environment, which arguably evolves more slowly than a focus event.[45] Casper has documented the shared effort of "private citizens who work together in pursuit of collective goals relevant to actual or potential disasters."[46] Although emergent behavior—citizens' jumping into the fray to assist—occurs in both natural disasters and focus events, Casper emphasizes how organizational leadership could plan for groups of people in the various stages of a disaster cycle: preparedness, response, and recovery.[47] The point is that emergent groups that show up at various stages of a disaster are immensely different from the emergence of a crowd at an event within the first 15 minutes of an incident. I recognize the variance between an emergent group responding due to a perceived need in a natural disaster and the immediate need, for example, of a person requiring the life-saving intervention of a tourniquet in a focus event.[48]

Emergence occurs as a product of self-organization. Casper notes that there is a common mission or goal observed by a group of people to explain "why" self-organization occurs.[49] Smith and Stevens add to this principle of a common mission or goal with the concept of *adaptivity*. The conditional need to survive is a fundamental characteristic of adapting to the surroundings by self-organizing systems.[50] It bears repeating that few studies have examined emergence related to focus events; indeed, the connections of self-organization and emergence are largely applied to natural disasters. However, the identified

[44] Nancy Casper, "Organizational Leadership's Impact on Emergent Behavior during Disaster Response and Recovery Operations" (master's thesis, Naval Postgraduate School, 2011).

[45] Casper, 1–4.

[46] Robert A. Stallings and E. L. Quarantelli, "Emergent Citizen Groups and Emergency Management," in "Emergency Management: A Challenge for Public Administration," special issue, *Public Administration Review* 45 (January 1985): 94, https://doi.org/10.2307/3135003.

[47] Casper, "Organizational Leadership's Impact on Emergent Behavior," 10–11.

[48] Casper, "Organizational Leadership's Impact on Emergent Behavior," 11; Caitlin M. Price, "Boston Marathon Bombing and Experiences of Solidarity: The Race to Understanding" (master's thesis, Virginia Commonwealth University, 2015), 8.

[49] Casper, "Organizational Leadership's Impact on Emergent Behavior," 12.

[50] Thomas S. Smith and Gregory T. Stevens, "Emergence, Self-Organization, and Social Interaction: Arousal-Dependent Structure in Social Systems," *Sociological Theory* 14, no. 2 (July 1996): 137, https://doi.org/10.2307/201903.

behavior of emergent groups by Stallings and Quarantelli recognizes a "we-ness" and the pertinence of individual knowledge, skills, and abilities to emergence in focus events.[51]

3. Social Identity Theory and the Elaborated Social Identity Model

A more modern, malleable way to examine crowd behavior during a focus event is through social identity theory (SIT), created by Henry Tajfel in the 1970s. The theory is beneficial to this research because it addresses two distinct relationships observed at a focus event. First, SIT helps to evaluate how a crowd experiences a focus event. Second, it describes the relationship between the first responders and the crowd. Understanding how these relationships are distinct yet related is important for the first-responder community in planning its response to a focus event.

SIT applies a heuristic approach to relationships between people who form connections as groups—namely, in-groups and out-groups—through interaction and communication, as witnessed in crowds experiencing a focus event.[52] Three components of SIT assist in identifying an individual's group membership: the cognitive component understands one's belonging to a group; the evaluative component determines the positive or negative connotation of belonging to the group; and the emotional component is derived from the other two elements. Both the cognitive and evaluative components of a group lead to a variety of emotions that are directed toward an individual's group, including individuals and groups that have certain relationships with it.[53]

In addition to these components, certain analytical markers contribute to the relationships established to create in-groups and out-groups: the patron–client relationship, honor–shame acquisition and avoidance, the challenge–response cycle, and limited good as it relates to resources.[54] When placed in the context of a focus event, there is an identifiable relationship among the analytical markers and a crowd's response to the event.

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[51] Stallings and Quarantelli, "Emergent Citizen Groups and Emergency Management," 95.

[52] Anders Strindberg and Mats Wärn, *Islamism: Religion, Radicalization, and Resistance* (Cambridge: Polity, 2011), 64.

[53] Strindberg and Wärn, 64–65.

[54] David Brannan, Anders Strindberg, and Kristin Darken, *A Practitioner's Way Forward: Terrorism Analysis* (Salinas, CA: Agile Press, 2014), 67.

a. Patron–Client Relationship

The purpose of this section is to present the unique relationships among the individuals within the crowd and between the crowd and responders.

1. Crowd: The crowd has a set of internal in-group and out-group establishments. The two groups can be broken down into "fight" or "flight." The fight group comprises individuals who take positive actions to assist themselves or others whereas the flight group comprises individuals who flee in despair or freeze in inaction.

2. Responder–Crowd: The relationship between the responders and crowd may or may not have been established at the outset of a focus event, depending on the pre-incident posture of first responders and resulting interactions. However, the relationship will unfold as responders arrive and establish a presence. The overall success of the response could hinge on how well this relationship is established; options include traditional authoritarian direction by responders and the integration of the crowd as immediate responders.

b. Honor–Shame Acquisition and Avoidance

Honor in the context of the crowd experiencing a focus event is positive public acknowledgment and "hero" status while the opposite, negative connotation is shame.[55] The application of honor and shame is the same for the responders.

1. Crowd: The honor obtained by acting as an immediate responder or good Samaritan could explain why it is common to see civilians jump into action to form a fight in-group. Individuals can instill meaning in social settings by belonging to an in-group.

2. Responder–Crowd: Honor and shame are precisely what is at stake for the first responders with the rest of their community. Depending on how

[55] Brannan, Strindberg, and Darken, 70.

effective their response is to the focus event, they could gain or lose in either category.

c. Challenge–Response Cycle

This cycle describes the interaction between competing groups.[56] The challenge–response cycle in this research has two components: 1) the challenge between the crowd and perpetrator of the focus event and 2) the interaction between responders and the crowd.

1. Crowd: The challenge is not internal but rather imposed on the collective crowd by an outside party. The response to such a challenge is precisely what this research attempts to identify with an analytical approach.

2. Responder–Crowd: The first-responder community plans for the response to a third-party disruption to the crowd, but the response to this challenge is often based on traditional crowd psychology. The challenge–response dynamic for responders is the emphasis of this research because of the recognized room for improvement. The crowd and responders may have competing actions but not competing goals.

d. Limited Good

The main limited good at a focus event is resources such as medical supplies and people to provide assistance. Limited good can also include status, but that is unlikely during a focus event.

1. Crowd: In reference to the fight or flight groups within the crowd, the fight group has a limited good to offer the flight group. This limited good could include improvised tourniquets, non-traditional transport to the hospital, or an escort to safety.

2. Responder–Crowd: The limited good from the responder to the crowd is more obvious—medical equipment, law enforcement protection, and transport to the hospital, among other things. Notably, the fight group

[56] Brannan, Strindberg, and Darken, 70.

provides first responders with a limited good, for instance, additional manpower to move injured persons or assist with application of medical bandages.

The utility of SIT offers a fresh perspective of crowd behavior during the first 15 minutes of a focus event. Namely, the individuals who comprise a crowd spontaneously and informally establish and function with a leadership structure that is related to their social category.[57] The subsequent crowd reaction is as an expression of enduring empowerment, as explained by the elaborated social identity model.

The elaborated social identity model (ESIM) represents the evolution of SIT and better explains the intergroup dynamics that yield group empowerment. Drury and Reicher describe empowerment as the "social-psychological state of confidence in one's ability to challenge existing relations of domination."[58] ESIM intergroup dynamics of a crowd challenge preconceived ideas of helplessness and shed light on responder opportunities to leverage the crowd. With ESIM, there is a greater emphasis on the intergroup encounters that compose crowd events.[59] The two dynamics needed for empowerment are collective action and asymmetry of power relations.[60] This research posits that the asymmetry of power relations is applicable to a crowd in survival mode when first responders arrive. Planners have an opportunity for the social contract to be redefined between first responders and the crowd so that the crowd can be leveraged as part of the solution to the overall response. As noted by Reicher and Drury, the catalyst for support of shared goals from the crowd for enduring empowerment involves active measures of inclusion along with the need for mutual support.[61]

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[57] Clifford Stott and John Drury, "Contemporary Understanding of Riots: Classical Crowd Psychology, Ideology and the Social Identity Approach," *Public Understanding of Science* 26, no. 1 (2017): 11, https://doi.org/10.1177/0963662516639872.

[58] John Drury and Steve Reicher, "Explaining Enduring Empowerment: A Comparative Study of Collective Action and Psychological Outcomes," *European Journal of Social Psychology* 35, no. 1 (2005): 35, https://doi.org/10.1002/ejsp.231.

[59] John Drury and Steve Reicher, "Collective Action and Psychological Change: The Emergence of New Social Identities," *British Journal of Social Psychology* 39, no. 1 (December 2000): 581.

[60] Drury and Reicher, "Explaining Enduring Empowerment," 37.

[61] Drury and Reicher, 45–48.

D. RESEARCH DESIGN

This study investigates crowd behavior by evaluating emergence from a crowd and the formation of a complex adaptive system (CAS). A CAS includes such variables as emergence and self-organization, individualization, crowd dynamics, and crowd psychology. The patterns of self-organizing in the context of a focus event occur within the first 15 minutes of violence erupting, and within that timeframe, individuals work together and teams form—intertwined in complex ways. The individuals forming these ad hoc teams establish relationships based on any number of factors, for example, ethnicity and gender.[62] Although an individual may participate in more than one team, patterns emerge, and a new system-wide behavior takes shape, displaying how individual efforts produce a smooth and constructive self-organizing behavior.[63] The goal of this research is to provide actionable recommendations based on the findings.

The use of CAS to evaluate focus event crowds demands a break from traditional theories. In their 2017 article, Stott and Drury discuss the evolution of crowd psychology from archaic theory tied to the emerging politics of industrial society to more contemporary sociological theories such as SIT and ESIM.[64] This study is based on the researcher's belief that SIT and ESIM, as complements of CAS, are better suited than crowd psychology to describe crowds experiencing a focus event.

The two case studies—the Las Vegas mass shooting and the Boston Marathon bombing—provide the limitations and focus needed to draw conclusions on causal relationships between the two events. Admittedly, the mode of each attack in the case studies is different and could have influenced the crowd's reaction; nevertheless, the objective of the research is to evaluate the focus event crowd as a CAS and understand its emergent behavior, not the methodology of attack. The intent is to draw correlations between crowd demographics and crowd response (including emergence) during the focus event while also examining pre-event posture and initial response by the first responders.

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[62] Eoyang, "Self-Organizing in Human Systems," 12.

[63] Eoyang, 12.

[64] Stott and Drury, "Contemporary Understanding of Riots," 6.

Research for the cases was derived from open sources, and no new interviews were conducted. Some of the information is conveyed through the experience of the researcher, who responded to the shooting in Las Vegas. The cross-case analysis draws out similarities and differences between the two incidents. As noted by Kathleen Eisenhardt, "The juxtaposition of seemingly similar cases by a researcher looking for differences can break simplistic frames."[65] Ultimately the goal is to break away from the simplistic assumptions about crowd stress leading to panic and chaos as part of the traditional response framework.

E. CHAPTER OVERVIEW

This thesis begins by evaluating focus event crowds as CASs with an emphasis on their non-linear nature. Chapter II challenges outdated crowd psychology and behavior theories in describing current focus event crowds. Self-categorization and self-organization theories are then used to explain some of the emergent behaviors observed in a focus event crowd. Chapter III presents two cases studies—of the Las Vegas mass shooting and the Boston Marathon bombing—to build a framework for an "out-of-the-box" solution for the first-response industry.[66] Chapter IV describes a new framework using crowd stress, panic, chaos, and priming for leadership to consider in their planning. Chapter V delivers actionable recommendations for the first-responder community based on the research findings. As the likelihood of another focus event occurring seems inevitable, the framework derived from this research should have ample opportunity for field assessment.

[65] Kathleen M. Eisenhardt, "Building Theories from Case Study Research," *Academy of Management Review* 14, no. 4 (October 1989): 541.

[66] Eisenhardt, 546.

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II. THE PROBLEM WITH THE STATUS QUO: TAKING TIME TO UNDERSTAND THE CROWD

This chapter offers background and a framework for understanding a crowd's experience of a focus event—an intentional act of violence during a planned event. To this end, this chapter covers the general history of crowd psychology and behavior, as well as the limits of these models in contemporary focus events. Then, it applies CAS theory to a crowd experiencing a focus event as a fresh way to evaluate its non-linear attributes and behavior. This insight into the non-linear nature of crowds should help the emergency responder community develop contingency plans for focus events. In addition to crowd non-linearity, planners should understand the self-organizing, order-seeking behavior exhibited by a crowd at the edge of chaos. Last, the chapter applies self-organization and self-categorization theories to explain the crowd's tendency to take its behavior to the edge of chaos before seeking order, as described by CAS.

A. CROWD PSYCHOLOGY AND BEHAVIOR

Gustave Le Bon, one of the pioneers of crowd psychology as a science in the mid-19th century, noted that crowds comprise individuals who lose their individuality and become part of a collective mind.[67] Le Bon's seemingly neutral words, in fact, laid the foundation of distaste for if not distrust of the crowd as a mindless mob: "Crowds are somewhat like the sphinx of ancient fable: it is necessary to arrive at a solution of the problems offered by their psychology or to resign ourselves to being devoured by them."[68] This mentality has persisted for decades, informing the views of, among others, the first-responder community, which finds itself with limited options for dealing with bystanders who are very clearly "them." Thus, the expectations tend to be either an inevitable fight or a struggle to control the mob/crowd so as not to be overrun. Christopher Barney similarly notes that the Le Bon mentality has made law enforcement officers and

[67] Le Bon, *A Study of the Popular Mind*, 11–13.

[68] Gustave Le Bon, *The Crowd and the Psychology of Revolution* (San Bernardino: Project Gutenberg, 1996), 51, http://www.gutenberg.org/ebooks/445.

policymakers ill-equipped to manage crowds because of their presupposition of crowd irrationality and potential for violence.[69]

Pioneers of crowd psychology, like Moscovici, have concentrated on how politicians and leaders might control and manipulate a crowd's behavior in their favor during times of political and socio-economic struggle. Le Bon's book, *The Crowd*, has been referenced by dictators, including Hitler and his propaganda minister, Joseph Goebbels.[70] This volume lends context to the early development and influence of crowd psychology as a science and forms the typical foundation from which modern-day first-responder policies are derived. The problem is that both the crowd's and the expert's understanding of it have evolved considerably while first-responder policy and practice have not.

B. COMPLEX ADAPTIVE SYSTEMS

To dismiss an event crowd simply as a group of people who have gathered for a common reason is to miss an opportunity in understanding how to plan more effectively for a crowd. The characteristics of a crowd involved in a focus event can be compared to a CAS. Chiefly, the complexity and non-linear make-up of an adaptive system relate directly to the characteristics of a crowd amid a focus event.

Non-linear behavior is an important aspect of crowds during a focus event because responders have traditionally assumed that the crowd will react in outright panic and total chaos as an expected linear response. The general idea that crowds will behave in a disorderly manner is precisely "non-linear." However, a crowd, like a complex system, is composed of numerous independent elements that are dynamically interconnected.[71] The victims of the Las Vegas high-rise shooting and Boston Marathon bombing who lay on the ground shouting for help had independent interactions with other individuals within the

[69] Christopher J. Barney, "The 'English Disease' and Political Protest: How Social Identity Theory Can Enhance Public Safety at Crowd Events" (master's thesis, Naval Postgraduate School, 2019), 29–30, https://calhoun.nps.edu/handle/10945/63495.

[70] Moscovici, *The Age of the Crowd*, 64–65.

[71] Carla Crandall, "If You Can't Beat Them, Kill Them: Complex Adaptive Systems Theory and the Rise in Targeted Killing," *Seton Hall Law Review* 43, no. 2 (2013): 604.

vicinity; fellow crowd members displayed stress while performing life-saving actions of emergence or fleeing from the scene without offering assistance. Although all individuals do not react in the same way, their actions demonstrate interconnected relationships with other members of the crowd. For instance, if two bystanders within the vicinity of a victim are both ready to help and the first one renders aid, the second bystander will move on to assist someone else. However, the non-linear make-up of complex systems does not assume this scenario will play out around a second victim because the two hypothetical bystanders might flee and not provide him with assistance. When observed from a distance, a crowd involved in a focus event may appear to respond with mass panic, but when evaluated more closely, the crowd mimics a CAS, including all of the nuanced patterns that develop within it, particularly during a focus event.[72] The reason the crowd appears to be in mass panic can be explained by CAS's operating at the edge of chaos.

Planners generally assume that crowds involved in a focus event react in chaos, but the lens of CAS suggests such a perception is to be expected. As described by Pascale, Millemann, and Gioja, "In the face of threat, or when galvanized by a compelling opportunity, living things move toward the edge of chaos."[73] Disorder is a necessary condition of CASs for order to emerge rather than be forcefully designed into the system.[74] When this concept is put into the context of crowd evacuation, for example, an observer will discover that many of the elements composing a crowd that resemble disorderly interaction may evolve into pattern creation.[75] With this understanding, crowds no longer present absolute chaos, but live on the edge of chaos. The challenge to the responder community, then, is grasping what the edge of chaos means to planning and response. I agree with Stott and Drury about the need to abandon both the traditional view of crowds as mindless groups of panicking people and the consequent response planning. Furthermore, in the context of CAS, the responsibility of this paradigm shift from a chaotic

[72] Bruce A. Waltuck, "Characteristics of Complex Systems," *Journal for Quality and Participation* 34, no. 4 (January 2012): 13–14, ProQuest.

[73] Pascale, Millemann, and Gioja, *Surfing the Edge of Chaos*, 6.

[74] James Ladyman, James Lambert, and Karoline Wiesner, "What Is a Complex System?," *European Journal for Philosophy of Science* 3, no. 1 (January 2013): 58, https://doi.org/10.1007/s13194-012-0056-8.

[75] Ladyman, Lambert, and Wiesner, 59.

expectation to one of understanding will benefit the response community through effectiveness. The area between chaos and stability can only exist in a complex system.[76] Furthermore, the interactions among individuals within the crowd are what equalizes behavior on the edge of chaos—a balancing between order and disorder.[77]

The ability of the complex system to adapt is precisely what makes it so complex and more difficult to understand and anticipate—especially in a focus event.[78] However, knowing an adaptive component exists makes it possible to find order because the adaptivity of the system will pull back from complete chaos and keep it from going over the edge. Planning for a focus event with the knowledge that total chaos will not occur empowers responders to leverage the adaptive nature of crowds in the moment of crisis.

C. SELF-ORGANIZATION

One of the phenomena associated with the adaptive nature of complex systems is the recognition of pattern development as a natural way for the system to adapt to its new environment.[79] An example of how crowds adapt in a focus event, as a component of any CAS, is through self-organization and emergence.[80] Self-organization is the process by which internal components (individuals) interact in dynamic ways to generate system-wide patterns.[81] Another definition is "a process in which pattern at the global level of a system emerges solely from numerous interactions among the lower-level components of a system."[82] The self-organized component of a CAS occurs organically and relies on the adaptive nature of the components of the system. For this research, it involves the crowd's responding to a focus event and the subsequent will to survive or assist others in survival.

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[76] Andrew Man Joe Ma and Bramwell Osula, "The Tao of Complex Adaptive Systems (CAS)," *Chinese Management Studies* 5, no. 1 (2011): 97, https://doi.org/10.1108/17506141111118480.

[77] Ma and Osula, 105.

[78] Crandall, "If You Can't Beat Them, Kill Them," 601.

[79] Crandall, 606.

[80] Waltuck, "Characteristics of Complex Systems," 13.

[81] Eoyang, "Self-Organizing in Human Systems," 11.

[82] Erna Káptalan et al., "Collective Behavior—A General Survey," *Journal of Computer Science and Control Systems* 4, no. 1 (May 2011): 58.

The self-organizing of a CAS is a means for the crowd to achieve order within the spontaneous situation it finds itself in.[83]

Self-organization as a theory explains why people organize themselves to gain a semblance of order when they are suddenly thrust into a situation perceived as chaos.[84] Self-organization can be observed in daily life at places like the supermarket or merchant stores. When lines exceed the given space, people self-organize in a fashion that extends the line to arrange an ordered approach to the cashier's counter. A line wrapping around a store or the behavior of drivers sitting in traffic are consistent with a multitude of patterns that dictate individual operation in daily living. Patterns are a natural component of human life and dictate how individuals find a sense of organization and order.

D. SELF-CATEGORIZATION

Self-categorization starts with the self and what the individual brings to a situation relative to one's knowledge about the self.[85] When individuals interact with other contextual factors, they develop self-categorization associated with them.[86] In other words, individuals in a crowd bring a level of awareness about themselves into an intergroup relationship. The role an individual takes when the context of the situation unfolds during a focus event directly relates to his or her knowledge about oneself. An individual's self-concept varies, based on the context, time, and situation, in fitting into a particular self-category.[87]

The Boston and Las Vegas case studies in the next chapter demonstrate that large numbers of individuals self-categorized outside the expectations of first responders—in other words, they did not see themselves as victims. As individuals experiencing a focus event, they identified with a particular category, for argument's sake, as individuals capable

[83] Crandall, "If You Can't Beat Them, Kill Them," 638.

[84] Crandall, 606.

[85] Paul A. M. Van Lange, Arie W. Kruglanski, and E. Tory Higgins, ed., *Handbook of Theories of Social Psychology*, vol. 2 (Los Angeles: SAGE Publications, 2012), 7, http://dx.doi.org/10.4135/9781446249222.

[86] Van Lange, Kruglanski, and Higgins, 2:7.

[87] Van Lange, Kruglanski, and Higgins, 2:7.

of rendering first-aid. In those first critical 15 minutes after a focus event commences, there are not enough professional first-responder resources on scene to attend to all of the injured patrons. Nevertheless, individuals in the crowd often self-categorize into an intergroup of good Samaritans to act and deliver medical aid.

Social influence plays a role in an individual's desire to associate with others through self-category. Though the individual experiences depersonalization, a new shared identity is born along with all of those around him in this redefined social reality. Furthermore, with this shared reality, the individual perceives others around him as part of himself and thus creates an emotional and behavioral bond whereby he cares for, acts in the interest of, and coordinates with those other individuals, even if they are strangers.[88] In the context of a crowd during the first moments of a focus event, all of those constituting the crowd have a shared interest in forging an emotional and behavioral bond. Small groups are typically referenced in comparing conformity and polarity phenomena within identified in-groups.[89] As such, the introduction of self-categorization in this research supplies a theory to apply to individuals at focus events to obtain a greater understanding of crowd behavior in the first 15 minutes post-perturbation.

E. CONCLUSION

The old tenets of crowd psychology and behavior are not applicable to modern-era event planning or, more importantly, contingency planning for a focus event. This thesis presents the idea of the responder community's approaching the crowd experiencing a focus event as a CAS and accounting for the crowd's non-linear quality to achieve a more effective response. The explanation of CAS as non-linear debunks the myth of mass chaos, along with the associated crowd stress and panic. Planners and responders are now challenged to break from traditional frameworks and contingency plan for crowds experiencing a focus event as complex adaptive systems. The CAS nature of crowds and

[88] John Drury, Chris Cocking, and Steve Reicher, "Everyone for Themselves? A Comparative Study of Crowd Solidarity among Emergency Survivors," *British Journal of Social Psychology* 48, no. 3 (2009): 489, https://doi.org/10.1348/014466608X357893.

[89] Michael A. Hogg and Scott Tindale, *Blackwell Handbook of Social Psychology: Group Processes* (Malden, MA: Blackwell, 2001), 64, ProQuest.

the avoidance of chaos are evidence of self-organization to obtain order. Last, self-organization leads the research to explore priming and emergence to help clarify how all of these theories intertwine and explain the non-linear nature of crowds experiencing a focus event.

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III. CASE STUDIES

This chapter evaluates the Boston Marathon bombing and the Las Vegas high-rise shooting as complex adaptive systems and draws relevance from these two case studies from a variety of angles. Each case study examines the demographics of the crowds, the pre-incident first-responder posture, crowd behavior and response, and the responders' initial response, concentrating on the first 15 minutes of the focus event response effort and corresponding crowd behavior. The findings support the non-linearity of crowds experiencing a focus event. Furthermore, planning lessons identify the importance of pre-staged, pre-coordinated resources and their effect on the overall response.

A. BOSTON

In observance of Patriot's Day on April 15, 2013, the city of Boston hosted the 117th Boston Marathon. The race featured a total of 27,000 official runners with an additional 3,000 unregistered "bandit" runners participating.[90] Advertised as a family event, the Boston Marathon traditionally opened the starting and finish lines to the public with no screening of persons or baggage. The race and spectators were shocked by an explosion near the finish line at 671 Boylston Street at 2:49 p.m. and another explosion only 13 seconds later, approximately one city block up the course, at 755 Boylston Street (see Figure 1).[91] At the time of the explosion, approximately 5,000 runners were still on the course.[92] After the attack, the Federal Bureau of Investigation determined that the explosions had been caused by two separate improvised explosive devices (IEDs) with

[90] Boston Fire Department, *117th Boston Marathon After Action Report* (Boston: Boston Fire Department, 2013), 1; Amanda Furrer, "Do Not Bandit Ever. Or at Least Don't Be an Asshole," *Runner's World*, November 1, 2018, https://www.runnersworld.com/runners-stories/g24479510/bandit-race-without-being-an-asshole/. Bandit runners are marathon runners who do not register for the event. Their presence at the event is not accounted for in planning, so the resources needed to address these extra runners are not included. Illegally purchased bibs create additional challenges for patient identification and tracking if bandit runners are injured because bibs are initially registered to someone else when they are purchased through a promoter.

[91] Boston Marathon Project Management Team, *After Action Report*, 37.

[92] Boston Marathon Project Management Team, 95.

intent to harm.[93] In all, the bombing resulted in three spectator fatalities and 264 injured persons.[94]

Figure 1. Location of Explosion Sites at the Boston Marathon[95]

1. The Crowd

The crowd at the Boston Marathon comprised two types of people. The first included participants in the marathon, ranging from elite world athletes, to mobility-

[93] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response to the Bombings and Mass Casualty Incident at the 117th Marathon on April 15, 2013* (Boston: Boston Fire Department, June 2014), 2.

[94] Boston Marathon Project Management Team, *After Action Report*, 15.

[95] Source: "Interactive Inspiration [32]," Visualoop, April 19, 2013, http://visualoop.com/blog/6636/interactive-inspiration-32.

impaired competitors, to average Americans trying to achieve a personal bucket-list goal.[96] The second included spectators at the starting and finish lines. The responders preparing for this event had anticipated a fairly representative crowd of men, women, and children of all ages. Furthermore, because of the history of this event, the number of spectators arranged at the high-profile areas near the starting and finish lines had been predicted and planned for.

2. Pre-incident First-Responder Posture

The planners and public officials in Boston had modified the all-hazards approach to their plan over several years to increase coordination and response capability. They had a strong level of coordination and command presence by standing up the Multi Agency Coordination Center (MACC) with public safety representatives from the eight cities and towns that hosted the Boston Marathon.[97] The planners of the 2013 Boston Marathon had applied lessons learned from the previous year, when many runners and spectators suffered from heat-related ailments along the course. In 2013, officials increased planning efforts by enhancing medical protocols and capabilities to bolster the medical system in order to support larger numbers of patients than they had previously prepared for—thus avoiding unnecessary patient transports to area hospitals.[98] In addition, the Boston Fire Department increased staffing and provided their firefighters with additional training and equipment (e.g., self-contained breathing apparatus facemasks with air-purifying respirator canisters, field tourniquets, and radiation monitors) to address an all-hazards incident.[99] The increased training, equipment, and staffing levels were good examples of how the Boston response community adjusted its planning based on their previous experiences and lessons learned.

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[96] Boston Marathon Project Management Team, *After Action Report*, 35–36.

[97] Boston Marathon Project Management Team, 71.

[98] Boston Marathon Project Management Team, 72.

[99] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 24.

The Boston response community practiced a robust all-hazards approach in preparation for the 2013 marathon.[100] The planning process included partnerships alongside local fire, police, and EMS with the Boston Athletic Association, Massachusetts Emergency Management, Massachusetts State Police, Massachusetts Department of Public Health, Massachusetts National Guard (MANG), American Red Cross, Boston Public Health Commission, and area hospitals.[101] The system was created as an all-hazards medical system with the intention of ensuring capabilities to handle a surge of patients with injuries ranging from scrapes and blisters to cardiac arrest.[102] The EMS surge capability entailed the deployment of 26 medical tents along the race course, of which eight had an enhanced capability.[103] As one of the eight tents, the Alpha Medical Tent, located near the finish line, served as the EMS hub for the race and was staffed by Boston EMS and medical volunteers including licensed physicians, physician assistants, and nurses.[104] The adjustments made by planners for the 2013 Boston Marathon based on previous experiences and lessons learned from previous years proved beneficial in the EMS response to the bombing.

To address potential chemical, biological, radiological, nuclear, and explosives (CBRNE) hazards, Joint Hazard Assessment Teams (JHATs) were pre-deployed by planners to provide for a rapid response.[105] Each JHAT comprised representatives from the Boston Fire Department's Hazardous Materials Team, Boston Police Department's Explosive Ordinance Disposal Team, MANG's Civil Support Team, and the Federal

[100] The all-hazards approach involves multiple agencies coordinating specific efforts, including information sharing. For example, the Massachusetts State Police, Massachusetts National Guard, and Boston Fire Department coordinated response resources for chemical, biological, radiological, nuclear, and explosives (CBRNE) material and relayed information to the MACC. The CBRNE team confirmed that the explosions had not dispersed radiological or chemical material and communicated its findings to the Massachusetts Department of Public Health to inform areas hospitals that patient decontamination was not a concern.

[101] Boston Marathon Project Management Team, *After Action Report*, 72.

[102] Boston Marathon Project Management Team, 72.

[103] Boston Marathon Project Management Team, 72.

[104] Boston Marathon Project Management Team, 82.

[105] Boston Marathon Project Management Team, 80.

Bureau of Investigation.[106] The JHATs used mobile and fixed monitoring equipment to constantly assess for CBRN contaminants in their respective areas.[107] In addition to JHATs, the Boston Fire Department staffed the Hazmat Group, consisting of a pre-staged decontamination engine company with seven personnel, and a multi-agency Special Emergency Response Team, which included six personnel from the Boston Fire Department, the Boston Police Department, and MANG's Civil Support Team.[108] The importance of the pre-incident deployment of these CBRNE resources is explained later in this chapter.

The Boston Police Department set up and staffed a Unified Coordination Center (UCC) to address the command-and-control element of the marathon, which included representatives from various agencies including a deputy chief from the Boston Fire Department.[109] Throughout the event, the UCC coordinated with additional multi-disciplinary partners that staffed the MACC.[110] The multiple agencies making up the UCC actively used the situational awareness tool WebEOC throughout the event to share information.[111] Despite these measures, Boston's *After Action Report* notes that it took approximately 30 minutes to stand up the UCC.[112] This author posits that a pre-established UCC would expedite the coordination and deployment of resources including those dedicated to patient care.

3. Crowd Behavior and Response

While two exploding IEDs stunned the crowd that fateful day in Boston, the people's response challenged the notion that chaos ensues in such crises. Through the CAS lens, the crowd acted seamlessly and showed the asymmetry of power relations of the

[106] Boston Marathon Project Management Team, 76.

[107] Boston Marathon Project Management Team, 80.

[108] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 10.

[109] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, 10.

[110] Boston Marathon Project Management Team, *After Action Report*, 73.

[111] Boston Marathon Project Management Team, 85.

[112] Boston Marathon Project Management Team, 79.

ESIM, as discussed in Chapter I. In other words, some individuals within the crowd reacted as though they were prepared for the focus event and expected to be included in the response effort by exhibiting the ability to care for themselves and others—and not relying on the assistance of responders. For example, as described by witnesses, the crowd acted collectively to assist the injured, demonstrating life-saving behaviors, solidarity, and shared emotion.[113] According to a fire officer who responded, one runner gave up his belt to use as an improvised tourniquet: "At that point the runner assisted me."[114] In another account of the crowd's behavior, a store manager near the bombings reported that people had asked what they could do in desperation to help and created makeshift responder groups.[115] The crowd in Boston exemplified the intergroup dynamics of ESIM, not panic or chaos.

Some crowd members were obstacles to responders during mitigation efforts. For example, individuals within the crowd at the Boston Marathon were heard by responders "screaming all over due to grotesque dismemberments and lacerations."[116] This crowd behavior challenged the responders' ability to focus, an example of a distractor. Distractors can also present themselves, as they did during this focus event, in unintentional impediments to the response effort. For instance, as responders were attempting to load the most critical patients into transport units, crowd members were also trying to load people in the same transport units without consideration of patient condition and triage prioritization.[117] The distractors and impediments from the crowd caused treatment delays for some victims because of the discord between the responders' priorities and the civilians' arbitrary attempts to assist.[118]

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[113] Price, "Boston Marathon Bombing and Experiences of Solidarity," 28–30.

[114] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 58.

[115] Price, "Boston Marathon Bombing and Experiences of Solidarity," 35.

[116] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 62.

[117] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, 63.

[118] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, 63–64.

4. First Responders' Call to Duty

The initial response within the first 15 minutes of the Boston Marathon bombing contained notable lessons to build upon. While it is typically difficult to predict how many victims to prepare for at any given event should a mass-casualty incident erupt, the response in Boston was quick to react positively to the 264 victims at the two bombing sites because of the planning leading up to the event. The response followed the all-hazards approach that planners had put into place.

The planners' pre-staged medical tents along the marathon route proved well positioned for a quick response to the two bombings, especially given the robustly staffed Alpha Medical Tent located close to the first bombing site near the finish line. The Alpha Medical Tent pivoted from treating runners to responding to a mass-casualty incident with large numbers of critical patients.[119] Located near the finish line, the medical hub for the marathon was quickly adapted to function as the EMS response hub for running triage, treatment, and management of the transport units.[120]

A notable shortcoming in the EMS response was the lack of available trauma care supplies and transport units. The responders on scene did well to adapt to the situation by using "cravats" (triangular bandages) as tourniquets and bandages to stop bleeding.[121] However, given the focus of this research to leverage the crowd to assist in the response, teaching the active bystander how to make an improvised tourniquet out of a cravat in an austere environment might be too technical or complicated compared to the verbal instructions or intuitive use of a tourniquet. Moreover, despite the abundance of responders on scene during the mass-casualty incident, the sheer number of victims overwhelmed them. Having enough medical supplies for immediate responders might have made a difference in the first 15 minutes while reinforcements were en route. The second factor effecting the EMS component of this response was the number of available patient transport units. Boston EMS immediately requested an additional 73 transport units, and

[119] Boston Marathon Project Management Team, *After Action Report*, 82.

[120] Boston Marathon Project Management Team, 82.

[121] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 15.

all of the staged transport units outside the blast area showed discipline by not entering the scene until requested.[122] However, the additional transport units were still not enough for the 264 injured individuals. Responders quickly identified a Boston Police Department prisoner transport wagon and employed it to transport patients to Massachusetts General Hospital.[123] The adaptability of the first responders was the key to addressing the EMS-related challenges.

The responders in Boston were forced to adapt because of the site layout for the marathon. Planners in Boston engineered the environment with interlocking pedestrian rails and bicycle racks to limit the access of pedestrians and vehicles throughout the marathon course; it also adversely created a barrier for responders to access the crowd.[124] Conversely, the interlocking rail restricted the crowd from accessing responders and medical supplies and evacuating the injured. Adaptability of the plan and situation by the responders was a continued theme in the response to the bombing.

The responsiveness of the JHATs was a highlight of the initial response. The ability of the JHAT teams to determine quickly that the IEDs were not dispersal devices and did not contain hazards that would require decontamination was critical to expediting treatment of patients.[125] JHATs quickly relayed to all healthcare partners that the IEDs had not released CBRN contaminants in the explosions, thus expediting medical treatment because there was no need for patient decontamination.

B. LAS VEGAS

On October 1, 2017, an estimated 22,000 people attended the Route 91 Harvest Country Music Festival throughout the day in Las Vegas, Nevada.[126] On the final night of

[122] Boston Marathon Project Management Team, *After Action Report*, 39.

[123] Manitou Inc. and Christian Regenhard Center for Emergency Response Studies, *Boston Fire Department Response*, 14.

[124] Boston Marathon Project Management Team, *After Action Report*, 93.

[125] Boston Marathon Project Management Team, 98.

[126] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report: 1 October/ Mass Casualty Shooting* (Las Vegas: Las Vegas Metropolitan Police Department, 2018), 3, https://www.lvmpd.com/en-us/Documents/1_October_FIT_Report_01-18-2018_Footnoted.pdf.

the three-day outdoor concert, a lone gunman opened fire from the 32nd floor of the Mandalay Bay Resort and Casino across the street from the 17.5 acre venue.[127] The terror persisted for the concert-goers for over 10 minutes before the gunman ceased firing and took his own life.[128] This focus event, deemed the deadliest mass shooting in modern U.S. history, resulted in 58 fatalities and over 850 injured, including responders.[129] I responded to the incident as the commander of a CBRNE response task force.

Figure 2. Location of Las Vegas High-Rise Shooting[130]

[127] Federal Emergency Management Agency, *1 October After-Action Report*, 7.

[128] Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 3.

[129] Federal Emergency Management Agency, *1 October After-Action Report*, 1.

[130] Adapted from Alex Lockie, "Las Vegas Gunman Paddock Checked in to His Hotel 3 Days before the Shooting," Business Insider, October 2, 2017, https://www.businessinsider.com/las-vegas-gunman-paddock-hotel-mandalay-bay-shooting-2017-10.

1. The Crowd

The crowd attending the Route 91 Harvest Festival has been described as having a cowboy mentality, with a "get it done" and "tough as nails" attitude exemplified on the night of the incident.[131] The cowboy mentality could be attributed to the actual cowboys in attendance or the off-duty military personnel, medical providers, and first responders among the concert-goers.[132] The shooting erupted during the final act of the festival, 25 minutes into Jason Aldean's performance at 10:05 p.m.[133] Considering the festival's start time of 2:45 p.m. that afternoon and a crowd drinking alcohol, many patrons were intoxicated and impaired and posed challenges to the response effort.[134] While concert-goers with a cowboy mentality yielded enormous assistance to responders—as did the athletes and families in Boston—the intoxication of attendees clearly affected the crowd's initial response efforts. For example, first responders were diverted from assisting injured concert attendees to restraining intoxicated individuals from impeding rescue efforts.[135] The presence of alcohol increased the complexity of the patron–client relationship between the crowd and responders. The intoxicated individuals added a layer of stress that was counterproductive in helping fellow concert-goers and the overall response effort because of their impaired judgment.

Another aspect in evaluating the crowd in this case involves not only its demographic composition but also the crowd's familiarity with the geographic area where the event was held. Most of the crowd attending the Route 91 Harvest Festival was not local to Las Vegas, with 90 percent of the concert-goers coming from out of town and 60 percent of those hailing from California.[136] This unique out-of-towner attribute affected the response and coordination of patient transports to the appropriate medical facilities

[131] Greg Cassell, "1 October Shooting" (presentation, Dallas, TX, August 2018).

[132] Federal Emergency Management Agency, *1 October After-Action Report*, 19.

[133] Federal Emergency Management Agency, 9.

[134] Federal Emergency Management Agency, 17.

[135] Federal Emergency Management Agency, 17.

[136] Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 13.

because immediate responders did not know where to go or transported the injured to medical facilities incapable of treating traumatic wounds. Additionally, responders were confused by the multiple scenes created by the expansive geographical area covered by fleeing concert-goers unfamiliar with the locale.[137]

2. Pre-incident First-Responder Posture

The primary focus on pre-incident first-responder posture in this section includes the pre-positioned command-and-control elements on the night of the shooting and the planning limitations imposed on Southern Nevada fire departments by ordinances and statutes. The pre-incident first-responder posture did significantly affect the response to this focus event, as 51 personnel from the Las Vegas Metropolitan Police Department (LVMPD) but no responders from the Clark County Fire Department staffed the event.[138] Notably, staffing in the Las Vegas valley varies from one jurisdiction to another and from one event to another. For example, when event promoters prioritize crowd control and order—and fail to consider the potential for injuries beyond first-aid, alcohol intoxication, and one-off major medical episodes—police disproportionately staff the event.

The Nevada Revised Statutes limit a fire department's authority to staff special events to medical care and do not include command-and-control staffing options.[139] The event promoters have the option to contract with private entities without consulting the fire department, depending on local ordinance. During the focus event on October 1, the minimum required EMS staffing, based on the location, event type, and expected number of attendees, was "one first-aid station at the site of the special event . . . with at least one registered nurse, licensed practical nurse or paramedic in lieu of an emergency medical technician; and . . . two or more roving intermediate emergency medical technician teams."[140] Notably, the single medical tent was located at the far northeast corner and the

[137] Clark County Office of Emergency Management and Homeland Security, 165.

[138] According to FEMA's *1 October After-Action Report*, the Clark County Fire Department was not involved in the event plans or operations by the promoter.

[139] Nev. Rev. Stat. § 450B (2017), https://www.leg.state.nv.us/NRS/NRS-450B.html.

[140] Nev. Rev. Stat. § 450B.690 (2015), https://www.leg.state.nv.us/NRS/NRS-450B.html.

stage at the southern-most area of the 17.5 acre site at the time of the shooting.[141] The single medical tent was the only pre-staged location with medical supplies.

First-responder command and control rely on strong communications, but there were early gaps in communication in response to the shooting in Las Vegas. The LVMPD and Community Ambulance dispatch centers were both in contact with their personnel working the Route 91 Harvest Festival leading up to and during the focus event. The fire alarm office (FAO), however, was not incorporated by the fire department into the event planning for the festival, thus challenging a coordinated response among the three fire departments—the Clark County Fire Department, Las Vegas Fire & Rescue, and the North Las Vegas Fire Department—under the same set of FAO dispatchers.[142] Because the FAO dispatchers were unaware of the large event, they struggled to communicate with the incident commander when the event became a mass-casualty incident.[143] Moreover, the Incident Command System structure was unclear to the dispatchers, which resulted in their confusion about command and control, as well as their communication directly with various sections and branches rather than the incident commander.[144] Reacting to this confusion, some responders circumvented command with improvised resource requests that ultimately challenged resource accountability and operational coordination.[145]

In contrast to Boston, there were no pre-deployed CBRNE assets for the Route 91 Harvest Festival. Because the focus event was a mass shooting, the lack of pre-deployed CBRNE resources did not hinder an all-hazards approach to the initial response efforts. However, the perpetrator of the focus event shot a 43,000-gallon tank containing jet fuel adjacent to the venue at McCarran International Airport.[146] There was not an immediate

[141] Federal Emergency Management Agency, *1 October After-Action Report*, 7.

[142] Federal Emergency Management Agency, 12.

[143] Federal Emergency Management Agency, 14–15.

[144] Federal Emergency Management Agency, 14–15.

[145] Federal Emergency Management Agency, 38.

[146] Kyung Lah and Scott Glover, "Las Vegas Shooter Fired 'Incendiary' Rounds at Fuel Tank," CNN, October 11, 2017, https://www.cnn.com/2017/10/10/us/las-vegas-shooter-incendiary-rounds/index.html.

need for CBRNE or supporting hazardous material team resources on October 1—but only because the fuel tank did not rupture when it was hit.

3. Crowd Behavior and Response

The crowd on October 1, 2017, at the Route 91 Harvest Festival was sent into panic when bullets began raining from the 32nd floor of the Mandalay Bay. The crowd in Las Vegas when viewed through the CAS lens also exhibited similar ESIM intergroup dynamics to those observed in Boston, empowering the group despite the differences in attack modality. The crowd in Las Vegas sprung into the ESIM dynamic of collective action as noted by paramedic Amber Ratto of AMR: "We had people who were shot holding pressure on other people's wounds."[147] Observation 14 in FEMA's *After-Action Report* speaks extensively to the crowd's collective action to provide life-saving measures and rescue aid to fellow concert-goers.[148] The large number of primed off-duty responders who were in the crowd contributed to the asymmetry of power relations between the responders and crowd. Off-duty responders have a natural in-group association with each other and are accustomed to operating in an austere environment like the one created by the shooting. The assistance offered by off-duty responders ranged from local responders to a considerable number of responders visiting from the Los Angeles area, all of whom made improvised tourniquets or triaged, treated, and transported victims.[149] Despite the considerable documented responders in the crowd, civilians also contributed to the response effort, as they did in Boston, by lending medical care and evacuation assistance.[150]

As in Boston, the crowd in Las Vegas also presented challenges to the responders in the form of distractors. For example, some distractors took the form of intoxicated individuals attempting to assist with treatment of victims. One particularly intoxicated,

[147] Fink, "First Medics on Scene in Las Vegas."

[148] Federal Emergency Management Agency, *1 October After-Action Report*, 18.

[149] Federal Emergency Management Agency, 12; New York City Fire Department, Center for Terrorism and Disaster Preparedness, "FDNY Fireguard: October 2017 Las Vegas Mass Shooting" (presentation, New York, New York, January 10, 2018), 9.

[150] Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 165.

off-duty, out-of-jurisdiction responder even assaulted medical care providers when he disagreed with the treatments they were administering.[151] Furthermore, off-duty responders became distractors to the on-duty first-responders by adding unintentional complexity with well-meaning attempts to take command or contribute.[152] As in Boston, the distractors caused by the crowd hindered response and coordination efforts.

Additional distractors that emerged outside the first 15 minutes of response are worth mentioning. Many concert-goers fled the scene, seeking refuge from the incessant gunfire and stopping in more than 20 different locations up to four square miles away from the venue; they posed additional coordination challenges, created overall confusion, and contributed to responder anxiety when they called 9-1-1 to request medical aid as shooting victims at these additional off-site locations.[153] The crowd's use of smart phones to locate hospitals or summon ride-share transportation to app-recommended medical facilities proved another distractor that helped and hindered operations because victims needing transportation were taken to area hospitals, but trauma centers were underutilized and patient tracking suffered.[154]

4. First Responders' Call to Duty

The persistent gunfire for more than 10 minutes also hindered the response in Las Vegas.[155] The relentless gunfire was a distractor that kept all fire and EMS resources not already on scene from entering the area deemed a "hot zone." Battalion 2 established incident command eight minutes into the shooting, and it took 15 minutes to assign North, South, and West divisions and establish the unified command, according to the timeline presented in FEMA's *1 October After-Action Report*.[156] This delay in establishing a

[151] Federal Emergency Management Agency, *1 October After-Action Report*, 17.

[152] Federal Emergency Management Agency, 24–25.

[153] Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 165–66.

[154] Fink, "First Medics on Scene in Las Vegas."

[155] Federal Emergency Management Agency, *1 October After-Action Report*, 1.

[156] Federal Emergency Management Agency, B-3.

command structure contributed to overall confusion with communications and resource tracking.

The responders in Las Vegas were forced to adapt to an evolving scene and incident footprint. All three of the geographic divisions were off site, so all patient contact in the first 15 minutes was driven by individuals who fled the concert and made their way to each respective division. North, South, and West divisions facilitated triage, treatment, and transport at their three respective locations while the immediate medical care provided within the venue was limited by the amount of available medical supplies specific to trauma care, much like in Boston.[157] Because the number of medical providers assigned to the event were quickly overwhelmed, many of the law enforcement officers assigned to work the special event assisted with staging, triage, and treatment. However, they lacked coordination with the overall response.[158]

In addition to not having adequate medical supplies on site for a mass-casualty incident, private vehicles were utilized because there were not enough transport units available for the sizeable number of victims requiring transport.[159] In many accounts, responders placed no more than a single patient in a transport unit, which contributed to the lack of available ambulances to transport the volume of patients. The use of private, non-coordinated transportation caused an imbalanced strain on the hospital system, and patient accountability, including documentation, suffered as a result.[160]

Similar to the Boston Marathon bombing, a CBRNE element responded to this focus event, but unlike Boston, the need for CBRNE resources was not urgent in the response. The shooter attempted to rupture nearby fuel tanks at McCarran International Airport by firing multiple rounds into them but was unsuccessful in breaching the tanks.[161] In addition, the shooter's vehicle, located at the parking garage of the Mandalay Bay,

[157] Federal Emergency Management Agency, 12.

[158] Federal Emergency Management Agency, *1 October After-Action Report*, 12–13; Clark County Office of Emergency Management and Homeland Security, *1 October Operational Coordination*, 109.

[159] Federal Emergency Management Agency, *1 October After-Action Report*, 12.

[160] Federal Emergency Management Agency, 22.

[161] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 78–81.

contained exploding targets and explosive precursors that required CBRNE and Bomb Squad resources to render them safe.[162] Although the CBRNE element was not an immediate response concern, these resources were used in response to the focus event.

C. CONCLUSION

The common thread between the crowds in Boston and Las Vegas was their non-linear nature. Both case studies highlight the CAS attributes of these crowds, including the observed emergence explained by ESIM. Recognizing such attributes rationalizes crowd behavior during focus events and debunks the preconceptions of chaos. Furthermore, leaders and planners can use the information as a jumping-off point for future policies and planning.

Officials who plan events are responsible for and should be concerned with understanding the potential effects of their engineered safety measures, such as pedestrian rails, on a mass-casualty incident response. In those initial moments of the first gunshots or after a blast, as in Las Vegas and Boston, responders should possess the training to adapt quickly to the environment and manage the individual distractors created within and by the crowd.

The emphasis of pre-incident posture in this chapter centered on command and control and patient care. A robust pre-incident posture prepares the responders and event staff for a more coordinated, responsive effort should a focus event occur. While the responder community has a long-standing history of producing lessons learned, it seems such lessons are mere observations in most cases. I urge planners to incorporate more thoroughly the noted crowd behaviors with appropriate adjustments tailored to the responders' ability to leverage the crowd—thus converting lessons *learned* to lessons *applied*.

[162] Las Vegas Metropolitan Police Department, 50–51.

IV. BEND, DON'T BREAK: A NEW FRAMEWORK FOR EVENT PLANNING

Planners now know to assess crowd demographics in planning for the patron–client relationship, which creates the identifiable, stress-driven, fight or flight in-groups. Responders should be prepared to help those individuals of the crowd who are frozen or have defaulted to flight mode. Equally important are having sufficient resources, leveraging the collective action of the primed crowd, and embracing the asymmetry of power. The first-responder community can leverage the group empowerment of ESIM when crowds like those in Boston and Las Vegas act with a willingness to assist without hesitation. The first-responder community can leverage the crowd during the first 15 minutes of a focus event when it has a better understanding of these historical crowd behaviors. When focus events are evaluated through the lens of CAS and ESIM, planners recognize that the social identity and position of individuals in a crowd will change during the course of the event based on their self-categorization, and when individuals engage in collective action, they share a common social identity.[163] The collective action of crowds leads to group empowerment. Responders and planners have an opportunity to leverage group empowerment, by understanding the roles of stress, panic, chaos, and priming, as revealed in immediate-responder emergence at focus events.

A. STRESS

One component to event planning for both policymakers and responders includes understanding the potential implications of stress levels of attendees during a focus event. Stress comes in many forms; on the one hand, stress can be positive, such as going for a promotion, or it can be negative and tolerable, such as a spousal dispute. On the other hand, stress can be chronic and toxic, such as trying to figure out where the next meal is coming from.[164] This research centers on the type of stress that drives the fight-or-flight behavior experienced by individuals in a focus event crowd. Unfortunately, as noted by other

[163] Drury and Reicher, "Explaining Enduring Empowerment," 37.

[164] Barrett, *How Emotions Are Made*, 203.

researchers, the empirical data to support this type of research is scarcely available due to the nature of the environment needed; therefore, the majority of the data is derived from computer simulations.[165]

Life-threatening environments, such as focus events, may precipitate the fight-or-flight response in individuals. Bernadette von Dawans et al. emphasize the importance of stress to individuals in a crowd in their article for *Psychological Science*: "Stress is an essential psychobiological mechanism that tunes the human organism to react to demanding circumstances."[166] Moreover, the additional demands of the threatening environment that create stress for individuals may be real or perceived, depending on the availability of adaptive coping mechanisms.[167] The stress presenting at a focus event will trigger the brain to respond, activating the sympathetic nervous system, which releases noradrenaline and adrenaline.[168] Although this research emphasizes the first 15 minutes of response to a focus event, the release of adrenaline and noradrenaline are of primary interest to the responder community because along with the release of adrenal glucocorticoids, they reach a peak level in the 15- to 30-minute range and slowly decline to pre-stress levels after 60–90 minutes.[169] While in that initial chemical release, some individuals experience effective coping whereby the brain and body coordinate functions of adaptation to the stress.[170]

Not all individuals within the crowd experience stress or cope in the same way. This explanation of individually experienced stress and the associated adaptive coping

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[165] Mehdi Moussaïd et al., "Crowd Behaviour during High-Stress Evacuations in an Immersive Virtual Environment," *Journal of the Royal Society Interface* 13, no. 122 (September 2016): 2, https://doi.org/10.1098/rsif.2016.0414.

[166] Bernadette von Dawans et al., "The Social Dimension of Stress Reactivity: Acute Stress Increases Prosocial Behavior in Humans," *Psychological Science* 23, no. 6 (2012): 651, https://doi.org/10.1177/0956797611431576.

[167] Bruce S. McEwen and Peter J. Gianaros, "Central Role of the Brain in Stress and Adaptation: Links to Socioeconomic Status, Health, and Disease," *Annals of the New York Academy of Sciences* 1186, no. 1 (2010): 190, https://doi.org/10.1111/j.1749-6632.2009.05331.x.

[168] E. Ron de Kloet, Marian Joëls, and Florian Holsboer, "Stress and the Brain: From Adaptation to Disease," *Nature Reviews Neuroscience* 6, no. 6 (2005): 463, https://doi.org/10.1038/nrn1683.

[169] De Kloet, Joëls, and Holsboer, 463.

[170] De Kloet, Joëls, and Holsboer, 464.

mechanisms gives leadership within the responder community another example of the non-linear nature of crowds. Furthermore, it highlights that the timeframe of the stress-induced chemical release coincides with the expected arrival of most responder resources—a critical time at which individuals within the crowd experience either fight or flight. Finally, within this timeframe, individuals who are coping well tend to demonstrate prosocial behaviors as a functional protective response, meaning they seek groups that can exchange joint protection during the focus event.[171]

B. PANIC

Leaders responsible for developing response plans and the responders who carry them out have been pre-programmed to anticipate a panicked crowd amid a focus event. However, the "panic" descriptor is not supported by empirical evidence.[172] Moreover, the concept of panic as crowd behavior is under scrutiny among the scientific community. The word is derived from the name of the Greek god Pan, who generated fear in the absence of an actual threat.[173] In the context of a focus event, the use of panic to describe the crowd is inaccurate because the threat is real and still active in some cases. Quarantelli and Ripley both acknowledge three factors needed for an individual to panic: the feeling of being trapped, a sensation of great helplessness, and a sense of extreme isolation.[174] Again, in the context of a focus event, it is very unlikely that a person experiences all three. Indeed, this research has shown how the actions of individuals in a crowd mitigate each of the factors needed for panic to exist.

Panic and, more specifically, the antiquated framework for mass panic of a crowd conflict with what is known about crowds today. The previously established elements of mass panic are as follows: the crowd is less intelligent than an individual and prone to

[171] Von Dawans et al., "The Social Dimension of Stress Reactivity," 652.

[172] Milad Haghani et al., "Panic, Irrationality, and Herding: Three Ambiguous Terms in Crowd Dynamics Research," *Journal of Advanced Transportation* (2019): 5, https://doi.org/10.1155/2019/9267643.

[173] E. L. Quarantelli, "The Sociology of Panic" (Newark: University of Delaware, Disaster Research Center, 2001), 4.

[174] Quarantelli, "The Sociology of Panic," 5–6; Amanda Ripley, *The Unthinkable: Who Survives When Disaster Strikes—And Why* (New York: Three Rivers Press, 2008), 151–52.

simple emotions; the crowd reaction to a focus event will be disproportionate to the actual threat; the overreaction will be contagious; and social bonds within the crowd will dissolve for self-preservation.[175] This research has shown these elements of the mass panic framework to be unsupported at every level. As noted by John Drury, "People die in a crowd in an emergency, not out of selfishness, but out of caring for each other according to these theories."[176]

The sight of people running in every direction without concern for anyone around them is precisely how people are portrayed on film; it makes for great entertainment and equally powerful discourse. Scientifically, panic has been used in social psychology to discount crowds and change the narrative to explain angry mobs, starting with Le Bon in the late 1800s.[177] The use of panic in this way has delegitimized crowds throughout time and fostered an authoritarian approach to emergency response planning.[178] To the detriment of the response effort, the discourse of mass panic has led to the mismanagement of responders. In particular is the intentional withholding of information from the public to keep people from panicking.[179] Communication with people is a critical element between leadership, responders, and organizers and should not be dismissed because there is a fear of causing panic among the crowd.[180] Withholding information or dispensing misinformation for fear of panic potentially increases existing fears or discredits authorities.[181]

[175] Drury, Cocking, and Reicher, "Everyone for Themselves?," 488.

[176] Drury, *Group Dynamics*, 4.

[177] Cocking and Drury, "Talking about Hillsborough," 87–88.

[178] Cocking and Drury, 88.

[179] Kashmira Gander, "After Trump Downplayed COVID, Fauci Says 'Totally Nonsense' to Withhold Information to Avoid Alarming People," *Newsweek*, October 22, 2020, https://www.newsweek.com/trump-downplayed-covid-fauci-totally-nonsense-withhold-information-avoid-alarm-1541230.

[180] Ripley, *The Unthinkable*, 156–57.

[181] Thomas A. Glass and Monica Schoch-Spana, "Bioterrorism and the People: How to Vaccinate a City against Panic," *Clinical Infectious Diseases* 34, no. 2 (2002): 220, https://doi.org/10.1086/338711.

C. CHAOS

Crowds reside at the edge of chaos rather than occupy chaos, as complex systems are capable of adaptation.[182] In contrast, "chaos is that unlikely occurrence in which patterns cannot be found nor interrelationships understood."[183] The two main factors contributing to a CAS living at the edge of chaos, not in chaos, are non-linearity and underlying order.[184] One example of the non-linearity of a crowd during a focus event, is the "tenuous connection between cause and effect" of emergence by well-intentioned individuals.[185] Small actions by individuals within the crowd can have significant effects on the outputs of the response, such as individuals' transporting victims to the hospital in personal vehicles resulting in an unmanageable patient surge on a single hospital. The non-linear actions of the crowd are a natural search for order, as explained in subsequent paragraphs.

In chaos theory research, the recognition of complex phenomena directs attention to what makes a system complex and adaptive. The answer is in the non-linear nature of CAS—straight linearity does not exist.[186] In the context of life and the individuals within a crowd, it makes sense to see no straight path from encounter to encounter. Undeniably, variables within each interaction can and will influence the next interaction. When a perturbation strikes a crowd and individuals begin interacting, there are a variety of outcomes from each individual interaction that lead to other outcomes—including evacuation and first-aid as observed previously at focus events—but not absolute chaos.

In fact, the reason crowds do not reach absolute chaos is because at the edge of chaos, the crowd, as a CAS, finds a balance between order and flexibility.[187] The space created between chaos and order is the grey area of chaordic, where the opportunity lies

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[182] Stuart A. Kauffman, *The Origins of Order: Self-Organization and Selection in Evolution* (New York: Oxford University Press, 1993), 173.

[183] Pascale, Millemann, and Gioja, *Surfing the Edge of Chaos*, 6.

[184] Jonathan Sapir, *Thriving at the Edge of Chaos: Managing Projects as Complex Adaptive Systems* (Boca Raton: Taylor & Francis, 2020), 35.

[185] Sapir, 55.

[186] Sapir, 35.

[187] Sapir, 63.

for leaders of the response community to leverage the crowd.[188] In this chaordic space, the ability of the CAS to adapt to its surroundings is fundamental to its survival.[189] Planners who adopt a mindset to address the chaordic reality of the crowd as a CAS allow for planning that embraces crowd complexity, challenges, and the ensuing opportunities that can be leveraged.[190] By understanding the natural tendency of the crowd to move toward order, the mindset of leadership and planners can optimize the response by rejecting the false assumption of complete chaos. Moreover, the responder community can learn from this research that crowds cannot be guided using an authoritarian approach to planning and response—along a linear path—or there will be unforeseen consequences.[191] The challenge presented is in identifying what opportunities exist in the chaordic realm and experimenting with the options to meet the needs and resource limitations of the individual agencies.

D. PRIMING

According to Daniel Molden, priming involves "some stimulation of people's mental representation of social targets, events, or situations that influences subsequent evaluations, judgments, or actions."[192] Additionally, the effects of priming are assumed to occur outside individual awareness of the potential for influence, or the actual intention to use the activated representation in the appropriate moment.[193] However, there is no consensus on which priming mechanisms, including delivery methods, produce the desired effects.[194] Research has concluded that priming is a tool to influence an individual in specific social contexts to attribute a feeling of inclusion or exclusion.[195] The implications for desiring inclusion tie directly to SIT and ESIM.

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[188] Sapir, 52.

[189] Smith and Stevens, "Emergence, Self-Organization, and Social Interaction," 137.

[190] Sapir, *Thriving at the Edge of Chaos*, 62.

[191] Pascale, Millemann, and Gioja, *Surfing the Edge of Chaos*, 6.

[192] Daniel C. Molden, "Understanding Priming Effects in Social Psychology: What Is 'Social Priming' and How Does It Occur?," special issue, *Social Cognition* 32, no. S1 (June 2014): 4, http://dx.doi.org.libproxy.nps.edu/101521soco201432supp1.

[193] Molden, 4.

[194] Molden, 8.

[195] Molden, 4.

Using social order to connect these concepts is a natural fit. Social order is based not on biology but on the past activities of man, and is a human product.[196] Priming individuals to respond to a focus event and having them respond effectively are also the products of past activities. Priming places individuals in a position to identify with a specific group; presumably, it implies possessing particular attributes and a corresponding identity.[197] Planners might assume that a primed individual is inclined to participate actively during a focus event by using the tools learned from priming to produce a favorable group identity—in other words, being a hero—leading to collective action and group empowerment as outlined in the ESIM. The expected outcome within the focus event is emergence—a leverage point for planners.

The National Fire Protection Association (NFPA)'s most current edition of NFPA 3000, the *Standard for an Active Shooter/Hostile Event Response (ASHER) Program*, acknowledges priming through public education. NFPA 3000 is an effort to encourage local jurisdictions to take proactive measures to prime the public with education in such areas as survival strategies and actions, medical interventions for injuries caused by trauma, intervention equipment needs, and the expectations of emergency responders when they arrive.[198] The concept of priming is not original to the NFPA. The American College of Surgeons' Committee on Trauma introduced the Stop the Bleed campaign in 2015 as a way to prime non-medical, civilian personnel in hemorrhage control with the use of direct pressure and tourniquet application skills.[199] In a 2018 study to test the efficacy 30 days after initial training, 60 percent of subjects were able to recall the training with no refresher, and 100 percent could effectively perform hemorrhage control with on-site remediation.[200] Thus, the study suggests a high level of effectiveness in priming for life-saving measures

[196] Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Anchor Books, 1990), 52.

[197] Henri Tajfel, ed., *Social Identity and Intergroup Relations* (Cambridge: Cambridge University Press, 2010), 70.

[198] National Fire Protection Association, *Standard for an Active Shooter/Hostile Event Response (ASHER) Program*, NFPA 3000 (Quincy, MA: National Fire Protection Association, 2021), 20.

[199] Amelia M. Pasley et al., "Stop the Bleed: Does the Training Work One Month Out?," *American Surgeon* 84, no. 10 (October 2018): 1635–36.

[200] Pasley et al., 1637.

specific to a focus event. Nevertheless, the results indicate further research is needed to evaluate the effectiveness of recall in an austere environment like a focus event.

Priming will create a useful set of skills for individuals to intervene during a focus event. Those skills are often limited to the tools and equipment available to the individuals in the moment of need. In recognition of this limitation to enabling primed individuals or a crowd to perform as trained, Chief Julie Downey of Davie Fire Rescue introduced a new city ordinance requiring bleeding-control kits be collocated with automated external defibrillators.[201] Having the foresight to incorporate the primed public into response planning is a model that is achievable if leaders make a concerted and long-term commitment to their communities. The more accepted and available the efforts, such as Chief Downey's continuation of Stop the Bleed, the faster these concepts will accelerate. Programs that encourage priming will become the de facto standard in our society.[202]

E. CONCLUSION

This chapter presented a new framework that considers stress, panic, chaos, and priming as a way forward. Stress explains the phenomenon of fight-or-flight behavior displayed by individuals. The crowd experiencing a focus event will experience both fight and flight, so the opportunity lies with planners. The fight group is a point of leverage in planning for the response community and should be used as a force multiplier by way of impending emergence. The flight group within the focus event crowd is also expected and should also be planned for, but as identified in this thesis, the entire crowd is not stressed into flight. Because panic and mass panic are not applicable to focus event crowds, officials who foster a more honest relationship with the crowd via information do not create panic but rather instill credit and confidence in authorities. A somewhat synonymous descriptor of a focus event crowd is chaos, but research shows the CAS nature of crowds during a focus event lies in the chaordic zone where the crowd never reaches chaos but seeks order—historically through emergence. Finally, primed individuals within the crowd are

[201] Angelo Verzoni, "People Get Ready," *NFPA Journal* 112, no. 3 (May/June 2018): 32.

[202] William Werner, "What We've Got Here Is a Failure to Tourniquet: Increasing the Efficacy of Hemorrhage-Control Training" (master's thesis, Naval Postgraduate School, 2020), 29–30.

largely responsible for returning order to the focus event, so priming individuals within the community and planning for their presence at a focus event is a smart way to prepare for such incidents.

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V. CONCLUSIONS AND RECOMMENDATIONS

This thesis has evaluated myriad factors contributing to a crowd's experience during a focus event and the subsequent expectations of crowd behavior for planners and the first-response community to consider moving forward, particularly in the first 15 minutes of the response. The factors covered start with timeworn theories of crowd behavior as a background to show why planners and responders have dismissed crowds as potential partners in response to focus events. The research identifies a more applicable social psychology framework for crowds experiencing a focus event, through the concepts of stress, panic, chaos, and priming, to explain the experiences observed in case studies of the Boston Marathon bombing and the Las Vegas high-rise shooting. I have identified commonalities in crowd behavior and response along with first-responder pre-deployment and response through the case studies. The following findings and conclusions lead to actionable recommendations in the final portion of this chapter.

A. FINDINGS AND CONCLUSIONS

Le Bon's early work, which advocates the need to control crowds because of their irrational and impulsive behavior, lack of morality, and mob mentality, still shapes first responders' expectations of crowds, but these generalizations are not applicable to modern crowds experiencing a focus event.[203] Other misconceptions of such crowds are evident in the descriptors used, including panic and chaos. Planners and first responders who assume mass panic and chaos will ensue during a focus event consequently lose their ability to leverage a crowd experiencing a focus event.

Panic, as traditionally explained, is fear resulting in a collective flight from a threat in the hope of escaping.[204] Additionally, Quarantelli and others argue for the removal of the panic concept vis-à-vis collective behavior, as the origins of chaos denote a complete

[203] Le Bon, *A Study of the Popular Mind*, 16–17, 28.

[204] Quarantelli, "The Sociology of Panic," 4–5.

lack of structure or systematic composition.[205] These traditional definitions show how planners and the first-responder community discount the crowd as a partner in response efforts by ignoring the complexity thereof. The research acknowledges the complexity of a crowd and thus identifies a more applicable theory in CAS to be applied to crowd behavior during a focus event.

The key finding and connection between a crowd experiencing a focus event and a CAS are their non-linearity. Both the non-linear CAS and the crowd experiencing a focus event exhibit a natural adaptation by the system to achieve order. The natural desire of a crowd to achieve order keeps it on the threshold of chaos—the chaordic zone—but the crowd never crosses over because living systems typically respond to the discordance of threats through efforts to reestablish stability.[206] Planners and first responders who view a focus-event crowd through CAS-colored glasses gain a complexity mindset, resulting in an outlook of accepting and accounting for the complexity of the crowd and acknowledging that certain factors in crowd behavior cannot be controlled by responders during a focus event response.[207] Furthermore, by adopting the complexity mindset, planners and responders extend their ability to leverage a crowd in the chaordic zone with the expectation of impending emergence.

An individual's release of adrenal glucocorticoids in response to the stress of a focus event is a great contributor to emergence.[208] The prosocial behavior of emergence is a type of protective response identified in stress research.[209] Of additional importance is the difference between stressed individuals within a focus-event crowd and the individual physiological responses as they seek safety and homeostasis.[210] Thus, the leverage point for planners and first responders is the essential psychobiological fight-or-flight stress

[205] Quarantelli, "The Sociology of Panic," 10; Edward N. Lorenz, *The Essence of Chaos*, Jessie and John Danz Lectures (Seattle: University of Washington Press, 2008), 3.

[206] Pascale, Millemann, and Gioja, *Surfing the Edge of Chaos*, 38.

[207] Sapir, *Thriving at the Edge of Chaos*, 62.

[208] De Kloet, Joëls, and Holsboer, "Stress and the Brain," 463.

[209] Von Dawans et al., "The Social Dimension of Stress Reactivity," 652.

[210] McEwen and Gianaros, "Central Role of the Brain in Stress and Adaptation," 5.

response exhibited by individuals within a focus-event crowd.[211] Individuals cope differently to stress, which explains why crowd behavior at a focus event is non-linear and better evaluated through CAS than the traditional linear mindset of mass panic or chaos.

Priming as a contributor to the individual responses observed in focus events is a beneficial tool for leveraging "immediate responders" within the first 15 minutes of such incidents. Furthermore, when priming is positively reenforced, it can contribute to the prosocial behavior of emergence that benefits the overall response outcome to a focus event, as identified in Boston and Las Vegas. Crowd members who are primed to act contribute to the response efforts of a focus event as immediate responders, as proven in the case studies.

The combined lessons from Boston and Las Vegas generate important findings and conclusions for the first-response community and future planners. The impetus for this thesis is needing to understand crowd behavior in response to a focus event, and a key finding is that immediate-responder emergence by the crowd is inevitable. Related to crowd emergence are the unintentional distractors created by the crowd, such as intoxicated individuals, access issues, and transport delays. Thus, crowd demographics should be evaluated as a factor in both crowd emergence and distractors caused by individuals. Indeed, the response community can and should pre-plan for crowd emergence and distractors, and responders should have the training to manage the individual distractors created within and by the crowd in those initial moments after the event. I urge agencies to incorporate the noted crowd behaviors from the case studies with appropriate adjustments tailored to the responders' ability to leverage the crowd—through lessons applied.

By understanding crowds experiencing a focus event as CASs, the responder community can better leverage the crowd during its response with more strategically pre-deployed resources. As demonstrated in the Boston and Las Vegas case studies, agency pre-deployment of resources and established working relationships among the first-responder community form a common thread in effective responses to focus events. The need for a UCC and unified command was recognized in Boston and Las Vegas. A delay

[211] Von Dawans et al., "The Social Dimension of Stress Reactivity," 651.

in establishing a unified command challenges overall incident response communication and resource tracking. This research posits that a pre-established UCC will expedite the coordination and deployment of resources including those dedicated to patient care. Planners and the first-response community can glean from Boston and Las Vegas the value and challenges of pre-deployed EMS resources. Moreover, pre-staged medical resources can be quickly overrun with patients, especially if there is an absence of trauma supplies for hemorrhage control. Also, a shortage of traditional EMS transport units can result in the improvised transportation of patients to medical facilities by civilians and law enforcement officers—in some cases, to facilities that do not offer the appropriate level of care for the injuries presented. Planners who evaluate the crowd as a CAS and pre-deploy resources can integrate the crowd behavior into their plans and prepare for immediate responders.

A final component of pre-deployment of resources to leverage the crowd, as identified in the case studies, is ensuring that proper resources such as specialty teams and dispatchers are integrated into the response plan. When a focus event occurs, the dispatch centers should not be learning of the mass gathering in that moment. They will be less effective if they are trying to grasp the situation in real time, as was the case in Las Vegas. The use of specialty teams, such as JHATs in Boston, minimizes any potential delays to patient treatment due to contamination concerns or the overall response because of additional threats. Furthermore, the use of specialty teams to gather real-time facts about the focus event will provide the unified command with the information it needs to communicate with event promoters, responders, and the crowd. As discussed in Chapter IV, information from authorities does not incite panic; information fosters credibility. Finally, all agencies that are potentially responsible for the mitigation of a focus event should be included in the planning phases of an event to determine the most appropriate pre-deployment posture for their respective resources.

B. RECOMMENDATIONS

Planners and the first-responder community must leave the antiquated negative rhetoric about crowd behavior behind. The time for a paradigm shift is now—crowds that

experience a focus event can be leveraged to harness the positivity presented in emergence. Planners and the first-responder community can adopt the framework presented by acknowledging crowds as complex adaptive systems. Crowd stress should precipitate emergence—not evoke the discourse of mass panic and ensuing chaos—and thus an opportunity to leverage primed individuals, immediate responders, to generate positive response outcomes. Public servants are viewed as leaders in the community, particularly during a focus event, so people will embody the direction of their leaders and follow their leadership, thereby strengthening the prosocial behavior of emergence.[212] Non-linear thinking and adaptability are needed by planners and first responders to maximize the utility of immediate responders, yet planners must not assume the next emergency will yield better outcomes because an agency experienced a previous focus event.[213] The ability to leverage a crowd for a more effective response in the first 15 minutes of a focus event starts with actually learning from lessons and adjusting plans.

The following recommendations are for planners to consider in preparing for a mass-gathering event. The first recommendation for planners starts with the complexity mindset and requires that agencies reject the assumption that there is a single way to prepare for mass gatherings. Planners should prepare responders for emergence: "If responders are to improve in responding, they must practice some improvising in their preparedness activities."[214] One recommendation to achieve improvisation at a focus event is to maintain a supply of hemorrhage control kits at pre-staged medical locations and in pre-staged apparatuses to augment the potential need. The hemorrhage control kits should be easily distributed and contain enough supplies to treat multiple people per kit. Additionally, training non-medical personnel, such as law enforcement, in the use of tourniquets can be the force multiplier needed either to physically attend to the large number of injured individuals or to direct immediate responders who need a real-time refresher or general guidance. Another recommendation for law enforcement officers is to familiarize themselves with triage, treatment, and transport, as utilized by the local EMS

[212] Van Lange, Kruglanski, and Higgins, *Handbook of Theories of Social Psychology*, 2:10.

[213] Quarantelli, "Emergent Behaviors and Groups," 16.

[214] Quarantelli, 16.

system. Officers in both case studies were placed in a position to assist with at least one of these three components. I propose that pre-staged resources with additional medical supplies and training give all responders the ability to pivot and adapt to a rapidly changing environment caused by a focus event. Moreover, acknowledging focus-event crowds as CASs and the probability of emergence over panic and chaos is crucial.

Additional recommendations for planners involve collaboration with all internal and external partners. Planners should involve dispatch centers in the plan and train dispatchers in Incident Command System protocols to minimize the confusion caused by a rapidly evolving incident. Whenever possible, dispatchers should be dedicated to the incident; otherwise, dispatchers should be prepared to pivot from day-to-day 9-1-1 operations to those of a mass-casualty incident. Furthermore, specialty resources should be involved in the planning process to give resource and pre-deployment recommendations based on their expertise, as exhibited in Boston. Regarding external partners, such as the ride-share services used extensively in Las Vegas, representatives from the companies should be included in the UCC to take advantage of crowd stress.[215] A representative could be used to direct resources and information in coordination with the command team. The last recommendation for planners involves information sharing, particularly with the crowd. Local planners ought to distribute the plan to the event promoter and disseminate information in as close to real time as possible. A communication plan to leverage immediate responders will give the crowd an active and positive role that will not only help in the response effort but also move the CAS more quickly to the state of order it already seeks.[216] Planners should treat all of their partners as capable partners and not exclude agencies, resources, or the crowd from their list.

Immediate responders are most useful if they are primed. Policymakers should consider expanding programs like Stop the Bleed in their jurisdictions in a collaborative and strategic way. For instance, they ought to establish partnerships with local hospitals,

[215] Some stressed individuals in flight mode use ride-share services to flee the scene or self-transport to medical care Conversely, stressed individuals in fight mode may assist victims by evacuating wounded and using ride-share services to get them to the hospital. In both cases, ride-share services may not take the wounded to an appropriate medical facility for the wounds sustained.

[216] Glass and Schoch-Spana, "Bioterrorism and the People," 220.

fire departments, and EMS transport companies to deliver training to identified community demographics in a coordinated effort. The more individuals who are trained, the greater the likelihood of having a reliable force multiplier in immediate responders on the scene of a focus event.

The final set of recommendations are in the form of ordinances. As experienced in Las Vegas, the local ordinance did not mandate that command-and-control elements be in place for the mass-gathering event. Every jurisdiction should evaluate the need for such mandates. Moreover, the size of the expected crowd should be worked into a sliding scale as a contributing factor in determining the required resources addressed in the mandate. Having pre-deployed command staff in communication with resources in the field minimizes confusion among resources responding to the focus event and maximizes their coordination and effectiveness with the resources already on scene. The final recommendation is in recognition of the ordinance put into place by Chief Downey, as mentioned in Chapter IV. Communities should take advantage of automated external defibrillator locations that people are familiar with and add bleeding-control kits. While the focus of this research is on a planned event's becoming a focus event, the availability of bleeding-control kits throughout a jurisdiction can be pivotal in unanticipated circumstances and help to develop a primed community.

C. THE WAY FORWARD

The studies of crowd behavior during a focus event are extremely limited, so this thesis presented a new framework to describe the elements of stress, panic, chaos, and priming in focus events. Additionally, the studies on emergence largely center on disasters and contain limited accounts of the faster-evolving nature of focus events. The observed behaviors of the crowds in the case studies illustrate the applicability of the non-linear characteristic of CAS and the new framework for crowds that experience focus events—both warrant future research. Learning to leverage a crowd in a positive way will assist large jurisdictions with considerable resources and smaller jurisdictions with limited resources. Planners who have a firm strategy for incorporating immediate responders into their plans can assist future research by identifying and explaining where the costs and

benefits lie between resources—for example, trained event staff, pre-staged response units, or additional hemorrhage control supplies. Furthermore, additional research should evaluate the responder community as a CAS with an emphasis on adaptability in the rapidly changing environment presented by a focus event.

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